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PERFORATING INFLAMMATION OF THE VERMIFORM APPENDIX;

WITH SPECIAL REFERENCE TO ITS EARLY DIAGNOSIS AND TREATMENT.[1]

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It appears that even the most recent systematic writers are by no means agreed as to the exact relation of inflammation of the cæcum and that of the appendix to peritonitis and perityphlitis. The vital importance of the timely and appropriate treatment of the disease in question is becoming more and more apparent. Such treatment is often postponed till hopeless, even if its application is at any time entertained. It was, therefore, to be anticipated that the critical consideration of a large number of unquestionable cases of perforation of the cæcal appendix might serve to make prominent the features essential for diagnosis and treatment.

In 1834, James Copland, in his *Dictionary of Practical Medicine*,[2] first discriminated between inflammations of the cæcum, the vermiform appendix, and the pericæcal tissue. Isolated cases of fatal inflammation of the appendix had been published from time to time before this date. Their importance did not become well recognized, however, till after Dupuytren's views had been made known concerning the relation of the cæcum to the production of what had hitherto been termed iliac abscess, or phlegmon of the iliac fossa. At the instigation of this eminent surgeon, Husson and Dance[3] published an article on the subject, apparently

[1] Read before the Association of American Physicians, June 18, 1886.

[2] Vol. i. p. 277.

[3] Répertoire Gén. d'Anat., etc., 1827, iv. 154.

expressing his ideas. These were subsequently personally presented by him in his *Lectures on Clinical Surgery*.[1]

In consequence of the interest thus aroused, Goldbeck,[2] at the suggestion of Puchelt, of Heidelberg, wrote his graduation-thesis upon the same subject. He adopted the views of the French writers, and applied the term perityphlitis to the disease described. His essay contains the report of a case of perforation of the appendix and associated peritonitis. But he regards it as one of fecal retention, and as quite distinct from the perityphlitis or inflammation of the connective tissue around the cæcum. He states that in fatal cases of the latter affection the appendix has been found intact.

Of the various names connected with the early history of the disease under consideration that of John Burne, Physician to the Westminster Hospital, deserves particular mention. In the first[3] of two admirable articles separated by an interval of two years, he calls attention to the material difference in the character of inflammation of the appendix and that of the cæcum. He attributes this difference to the peculiar conformation and situation of the former. His second paper[4] contains an additional number of cases of affections of the cæcum and appendix, a criticism of the opinions of the French writers, and a reiteration of his own views with such modifications as a more extended experience permitted. The name tuphlo-enteritis is offered as an equivalent for inflammation and perforative ulceration of the cæcum and of the appendix.

In the interval between the publication of the above-mentioned articles Albers[5] contributed a paper on inflammation of the cæcum. He first introduces the term typhlitis, and discriminates between acute, chronic, and stercoral typhlitis and perityphlitis. He charges Puchelt and foreign writers with confounding the last affection with the acute and stercoral varieties of typhlitis. The frequent termination of the perityphlitis in abscess is recognized, likewise the possibility of communication between the pus-cavity and that of the appendix or cæcum. This communication he regards as secondary. He says,[6] "It is not at all clear just why the *processus vermiformis* should be so often affected, for in this disease perforation of the cæcum should be far more likely than that of the appendix."

Although the term perityphlitis thus became synonymous with inflammation of the pericæcal tissue, the tendency was inevitably toward the recognition of a somewhat similar clinical picture and a different anatomical seat. Oppolzer[7] discriminated between cases of perityphlitis

[1] Leçons Orales de Clin. Chir., 1833, iii. 330.
[2] Ueber eigenth. entz. Geschw. i. d. rechten Hüftbeingegend, 1830.
[3] Med.-Chir. Trans., 1837, xx. 219.
[4] Ibid., 1839, xxii. 33.
[5] Beob. auf d. Geb. d. Path. und Path. Anat., 2ter Theil., 1838, i.
[6] Op. cit., p. 19.
[7] Allg. Wiener med. Zeitung, 1858, xx. 81; xxi. 86.

where the inflammation was situated in the connective tissue about the cæcum, and others where the inflammatory swelling lay between the iliac fascia and the bone. These were further distinguished from cases of encysted peritonitis in this region, and from perforation of the appendix. The latter was stated to be always productive of a circumscribed peritonitis, except when the perforation took place through the adherent peritoneum. Then both peritonitis and inflammation of the subperitoneal tissue would occur. The anatomical seat of the inflammatory process was thus further complicated. Oppolzer suggested the term paratyphlitis, which, according to Eichhorst,[1] represents an inflammation of the connective tissue behind the cæcum, while perityphlitis designates an inflammation of the peritoneal coat of the cæcum and appendix. Typhlitis is applied to an inflammation of the appendix and of the cæcum. Whittaker[2] uses the same definitions, while Ziegler[3] applies the term typhlitis to inflammation of the vermiform appendix, and perityphlitis to that of the parts in its vicinity.

The clinician obviously recognizes as of the chiefest importance the parts to which local treatment may be directly applied. His attention is thus conspicuously directed to the cæcum, which may be evacuated, or to the perityphlitic abscess, which may be emptied. The pathologist looks for the seat and causes of the disease, and finds that in most fatal cases of typhlitis the cæcum is intact, while the appendix is ulcerated and perforated. He sees that the so-called perityphlitic abscess is usually an encysted peritonitis. Furthermore, if an abscess exists in the pericæcal fibrous tissue, it is in most instances caused by an inflamed appendix. Finally, if the encysted peritoneal abscess, or the abscess in fibrous tissue behind the cæcum, does communicate with the latter, such an opening is usually the result, not the cause, of this abscess.

With,[4] influenced by the predominant importance of the independent consideration of inflammation of the appendix and its results, uses the term appendicular peritonitis to indicate the perityphlitis proceeding from disease of the appendix. As a circumscribed peritonitis is simply one event, although usually the most important, in the history of inflammation of the appendix, it seems preferable to use the term appendicitis to express the primary condition. This may terminate as an appendicular peritonitis or as a paratyphlitis. In like manner the rare, primary, perforating typhlitis (cæcal perforation) may be followed by a perityphlitis—that is, an encysted peritonitis about the cæcum, or by a paratyphlitis. The perityphlitic abscess of the surgeon, when seen early, is thus usually an encysted peritonitis of appendicular origin. More rarely, at this date, it may be the result of a suppurative para-

[1] Handb. d. Spec. Path. und Therap., 2ter Aufl., 1885, ii. 188.
[2] Pepper's System of Pract. Med., 1885, ii. 314. [3] Lehrb. d. Path. Anat., 4te Aufl., 1885., ii. 1.
[4] Nordiskt Med. Ark., vii. 1. London Med. Record, 1880, viii. 213.

typhlitis. The causes of this last affection are numerous and by no means confined to the appendix or cæcum, although a perforating inflammation of each of these parts of the intestinal tract may act as a cause.

Any attempt at explaining the various results of an inflammation of the appendix, must necessarily be preceded by a statement of the peculiarities it may present, with respect to structure and position. These peculiarities, though in part of congenital origin, in most instances bear evidence of having been acquired as the result of previous disease. This statement, based upon a long personal experience, is more than confirmed by the observations made elsewhere. Matterstock[1] states that Tüngel, during a period of two years at the Hamburg Hospital, found 30 instances of partial or complete obliteration of the appendix, 43 cases of catarrh and fecal concretions, 12 of abnormal adhesions, and 11 of tuberculous ulcers. All these in addition to perforations, and despite the fact that attention was not invariably directed to such peculiarities. Toft, as referred to by With,[2] found the appendix diseased in 110 out of 300 post-mortem examinations, every third person thus possessing a diseased appendix.

Personal observations have enabled me to recognize considerable variations in the length of the appendix, the longest being nearly six inches. Wister[3] alludes to one which was nine inches long. It is frequently seen with an attached fold of peritoneum and fat tissue, suggesting an omentum or mesentery. Its free end has been found in the iliac fossa, as well as behind the cæcum; along the brim of the pelvis and hanging into the cavity of the latter. Irregular positions have often been associated with fibrous adhesions. The appendix has been found thus attached not only in the places above mentioned, but also with its tip directed upward and its course more or less parallel with that of the cæcum, either behind, to the right, or to the left of this structure. It has also been found adherent to the mesentery with its tip bent at right angles and lying between the appendix and this structure. Kraussold[4] observed its course directed upward and backward, forming a loop around the ileum with its tip directed forward. It has been seen pointing outward, then forward, forming a loop around the lower end of the cæcum with its tip behind the latter.

Firket[5] records the adherence of the appendix to the ileum throughout the length of the former, with a communication between the cavities of the two and without an evident ulceration of the mucous membrane. Adherence to the rectum with a communication between the cavities of

[1] Gerhardt's Handb. d. Kinderkrankh., 1880, iv. 2, 897.
[2] Loc. cit.
[3] Trans. Coll. Phys. Philada., 1856–62, N. S., iii. 147.
[4] Volkmann's Samml. klin. Vortr., 1881, cxci. 1707.
[5] Ann. d. l. Soc. Méd.-Chir. d. Liége, 1882, xxi. 58.

each is recorded.[1] Adhesions of the tip to the mesentery, the rectum, and bladder are frequent. Its presence in a hernial canal led Shaw[2] to suspect a disease of the testicle. Thurmann[3] records a like occurrence, and the formation of a scrotal tumor as large as the two fists in consequence of an inflammation of the appendix. Its tip has been found[4] adherent to the abdominal wall in the vicinity of the navel, and pus has been discharged from it at this point.

Complete or partial obliterations of the canal are frequent. In the former instance a solid cord results. In the latter, a considerable cystic dilatation of the tip may follow; or a funnel-shaped pouch at the origin is often associated with obliteration of the remaining portion of the tube.

These variations in length, position, and patency, whether congenital or acquired, are of obvious importance in explaining many of the apparent differences in the clinical histories of typhlitis and perityphlitis. Their significance in the etiology of appendicitis will appear directly.

The frequent presence of foreign bodies in the canal of the appendix is of well-known occurrence. These are a variety of seeds, especially of fruit. Less common are hairs, particularly bristles, worms or their eggs, shot, pins, pills, and gall-stones. By far the most numerous are moulded masses of inspissated feces, more or less cylindrical in shape and of extreme variation in density. Some are of the consistency of normal excrement, while others are of stony hardness in consequence of their infiltration with earthy salts. The relative frequency of their presence in the appendix is manifested by the records of fatal cases of appendicitis, but their actual frequency far exceeds the number of these cases. In my own experience it is rather the rule than the exception for the appendix to contain moulded, more or less inspissated feces.

The frequency of such retention may be due to the congenital or acquired peculiarities of the appendix already described. German writers attach a certain importance to the presence of a valve-like projection of mucous membrane, discovered by Gerlach,[5] at the mouth of the appendix. Although a pinhole opening may result, any considerable obstruction must be of extreme rarity. The habits of individuals with reference to diet and regulation of the bowels are of unquestioned importance. Equally significant is the controlling fact, that most persons suffering from habitual constipation and accustomed to swallow the seeds of fruit, escape inflammation of the appendix.

Recognizing the lack of agreement in the use of the terms typhlitis and perityphlitis, a collection has been made of 257 cases of perforating

[1] Trans. Lond. Path. Soc., 1876, xxvii. 161.
[2] Ibid., 1848, i. 270.
[3] Prov. Med. and Surg. Journ., 1848, 477.
[4] Lancet, 1839–40, ii. 565.
[5] Zeitschr. f. rat. med., 1847, vi. 12.

inflammation of the appendix. By limiting the attention to the essential features of these cases, it was thought possible to recognize the characteristics of this sharply defined affection, by means of which it might be differentiated from all others occurring in this region. At the same time a comparison is drawn between many of these characteristics and those occurring in cases of typhlitis and perityphlitis. The latter terms are sufficiently indicative of a clinical picture, although its seats and causes suggest the importance of shades of distinction; 209 of these cases have been collected, and serve as the basis of a series of tables to be contrasted with those obtained from the analysis of the 257 cases of appendicitis.

The etiological importance of the presence of fecal masses and of foreign bodies in the production of inflammation of the appendix is well recognized. Matterstock[1] found in 169 cases of fatal perforating appendicitis that fecal concretions were present in 53 per cent., and foreign bodies in 12 per cent. In the series here collected, out of 152 cases the percentage[2] of fecal masses was 47 per cent., that of foreign bodies 12 per cent. It thus appears that in nearly one-half of the cases more or less inspissated feces were found, and that in nearly one-eighth of the series foreign bodies other than feces were present. Thus, in about three-fifths of all cases of perforating inflammation of the appendix either dried feces or foreign bodies were present in the tube. When seeds are stated to have been found, the evidence is not always sufficient to exclude the possibility of a mistake having been made as to the nature of the foreign body. Notwithstanding this large percentage the reality is undoubtedly much greater. Many are overlooked at the time of making the examination, others are macerated in the contents of the abscess. Still others, perhaps, escape with the pus, which makes its way outward through the various channels by which the abscess may communicate with the surface of the body.

The frequent immunity of the appendix from inflammation in the presence of inspissated feces and foreign bodies suggests the importance of other factors in the etiology. External violence is occasionally recorded as an immediate precursor of the attack. Among the 257 cases were 19 who were supposed to have received an injury, the result rather of indirect than of direct violence: from lifting a heavy weight in 9 instances, and from a fall or blow in 10. Among 209 cases of typhlitis and perityphlitis external violence immediately preceded the attack of the disease in 10 per cent.

Digestive disturbances are of obvious importance in the etiology of inflammation of the appendix, since this organ is a part of the alimentary canal. There were 15 instances of prolonged constipation, 9 of diarrhœa,

[1] Op. cit.

[2] In general, whenever percentages are given, fractions will be disregarded.

and 6 of vomiting. The attacks of diarrhœa and vomiting were usually the result of indiscretion in diet, but they were sometimes occasioned by the use of domestic remedies. These were administered for the relief of constipation or other disturbances attributed to a sluggish action of the stomach and bowels.

Among the cases of typhlitis and perityphlitis were 38 of constipation, 15 of diarrhœa, and 3 of vomiting; these symptoms being of apparent etiological importance.

Notwithstanding the frequency of typhoid fever and of intestinal tuberculosis, in which affections the mucous membrane of the appendix is often diseased, a resulting perforation seems to have been relatively infrequent. There were 8 of perforating ulcer of the tuberculous appendix, and 3 of this lesion in convalescence from typhoid fever.

Among the 209 cases of typhlitis and perityphlitis were 2 occurring in tuberculous persons.

The consideration of sex in 247 cases gives the following result: 197 males, 80 per cent., and 50 females, 20 per cent. These percentages are the same as those found by Fenwick[1] in the analysis of 130 cases.

In 209 cases of typhlitis and perityphlitis there were 156 males, and 53 females; 74 per cent. of the former, and 26 per cent. of the latter.

The age in 228 cases of appendicitis is recorded as follows:

From	20 months	to	10 years	. .	22	=	10 per cent.
"	10 years	"	20 "	. .	86	=	38 "
"	20 "	"	30 "	. .	65	=	28 "
"	30 "	"	40 "	. .	34	=	15 "
"	40 "	"	50 "	. .	8	=	3 "
"	50 "	"	60 "	. .	11	=	5 "
"	60 "	"	70 "	. .	1	=	½ "
"	70 "	"	78 "	. .	1	=	½ "

The age of the youngest patient was 20 months, that of the oldest, 78 years; 173 cases, 76 per cent. of the entire list, were under the age of 30 years, and nearly 50 per cent. were under the age of 20 years. Fenwick's[2] table of ages is based upon the consideration of 97 cases, and shows smaller percentages for the several decades up to the age of 40 years.

The age of the patient in 178 cases of typhlitis and perityphlitis was:

From	4 years	to	10 years	. .	10	=	6 per cent.
"	10 "	"	20 "	. .	53	=	30 "
"	20 "	"	30 "	. .	53	=	30 "
"	30 "	"	40 "	. .	25	=	14 "
"	40 "	"	50 "	. .	18	=	10 "
"	50 "	"	60 "	. .	10	=	6 "
"	60 "	"	70 "	. .	7	=	4 "
"	70 "	"	78 "	. .	2	=	1 "

[1] Lancet, 1884, ii. 987, 1039.

[2] Loc. cit.

From the above consideration it is apparent that perforating appendicitis is a disease most frequently occurring among healthy youths and young adults, especially males. Further, that attacks of indigestion and acts of violence, particularly from lifting, jumping, and falling, are exciting causes in one-fifth of the cases. A local cause is to be found in more than three-fifths of all cases in the retention in the appendix of more or less inspissated feces, or in the presence there of a foreign body. The retention of feces may be promoted by a constipated habit, but congenital or acquired irregularities in the position and attachments of the appendix frequently act as favoring causes. A fact in support of the last-mentioned statement is to be found in the frequency of successive attacks, one or more, of inflammation of the appendix. Among 257 cases were 28, 11 per cent., which presented similar symptoms of greater or less severity, at various intervals before the final attack. Recurrence is mentioned in 23 out of 209 cases, again 11 per cent., of typhlitis and perityphlitis.

The inflammatory process once excited, its course and results show extreme variations. A simple catarrhal appendicitis is to be recognized anatomically, but it is doubtful whether its clinical appreciation is possible. This appendicitis, in the absence of a concretion or foreign body, may progress toward ulceration, even to a peritonitis, which may terminate fatally. In the presence of a foreign body or concretion these events are of likely occurrence. On the one hand, the inflammation may result in the more or less complete obliteration of the canal of the appendix, with or without circumscribed dilatation. On the other, the ulcerative process becomes associated with a necrosis of the wall, a peritonitis, usually circumscribed at the outset, and perforation. In those cases where the appendicular peritonitis represents the extension of an inflammation through the wall of the appendix without perforation, permanent adhesions of the appendix to neighboring parts remain as evidence of the process. When it is associated with necrosis of the wall, the inflammation of the peritoneal coat tends to become diffused and productive of serous and cellular exudations. The adherence of coils of intestine to each other and to the abdominal wall favors the accumulation of the exudation in a limited space, and thus the formation of the tumor. At this stage the anatomical condition is a circumscribed peritonitis, the appendicular peritonitis of With. In certain instances the term perityphlitis might be applied in an exact anatomical sense, as the peritoneal inflammation frequently extends to the serous investment of the lower part of the cæcum. But in the last two cases of fatal appendicitis examined by me, the appendicular peritonitis was wholly pelvic. The changes observed in the appearance of the serous covering of the cæcum were of the same character as those affecting the peritoneum elsewhere. This peritoneal abscess may then become absorbed, or its

contents may escape into the general peritoneal cavity through ruptured or softened adhesions. In the latter event, as a rule, death rapidly follows. The exceptional case reported by Markoe[1] may be regarded as one of extreme rarity. A child with symptoms of general peritonitis on the second day, died a month later from another disease. The appendix had been perforated and the intestines were adherent in different places.

The product of the circumscribed peritonitis varies exceedingly in quality and quantity. Although it is usually thin, discolored, and very offensive, it may be thick, yellow, and odorless. In the post-mortem examination of a case of recent occurrence, where general peritonitis was the cause of death, the abscess contained perhaps an ounce of pus. The peritonitis was the result of a secondary mesenteric thrombophlebitis, while the primary appendicular peritonitis was apparently in a retrograde condition. The acute stage of the disease lasted more than six weeks. Barrett[2] states that he removed from a perityphlitic abscess, on the sixty-second day, more than a gallon of pus, liquid feces, and scybala. The presence of the last element indicates a communication with the large intestine.

If the case does not terminate as thus stated, the tumor may suddenly diminish in size with the discharge of pus from a hollow organ, as the intestine, bladder, or vagina. The anterior abdominal wall may become perforated and a sinus be established opening in the groin, lumbar region, or at the umbilicus. Shaw[3] mentions the occurrence of multiple abscesses of the scrotum from a perforated hernial appendix, and Thurmann[4] records a similar instance. Such sinuses often remain open for a long time, even many years. Through the kindness of Dr. A. T. Cabot, of Boston, I saw a patient with a fecal fistula which had existed for nineteen months. At the outset a tender swelling in the right groin had been incised, but the wound never healed. After an operation to promote the healing of the sinus, about an inch of the perforated appendix protruded from the wound. A similar protrusion had taken place six months earlier. The outer surface of the appendix was smooth, of a dusky red color, and the margin of the opening was sharply defined. Pressure upon the abdominal wall over the cæcum caused soft, yellow intestinal contents to appear in the wound.

The abscess may contain sloughs of tissue and yet be intraperitoneal. In a recent post-mortem examination I removed from the encysted abscess around the appendix a slough, three inches in length, representing the detached peripheral portion of the tube. Ballou[5] records a case where the sloughed appendix was discharged per anum, the

[1] Am. Med. Monthly, 1857, viii. 231.
[2] Va. Med. Monthly, 1875-76, ii. 120.
[3] Loc. cit.
[4] Loc. cit.
[5] Trans. R. I. Med. Soc., 1877-82, ii. 418.

patient recovering. In the case reported by Pooley,[1] apparently the entire appendix escaped as a slough from the wound.

The more protracted the course of the disease the greater is the probability of the destruction of the peritoneum forming the wall of the abscess. With the perforation of the parietal peritoneum may occur extensive necrosis, purulent and fecal infiltration of the abdominal walls. Within three weeks the iliac muscle may be destroyed and the ilium be bared. The course of the psoas and iliacus may be followed into the thigh, and extensive and deep-seated destruction of tissue with fecal infiltration be present in this region. The pus may extend through the obturator foramen, forming a deep-seated abscess of the hip and thigh, and may enter the hip-joint.

Moore[2] has shown that disease of the hip-joint may follow perityphlitis, and Gibney[3] has called attention to the possibility of mistaking cases of perityphlitis for disease of the hip-joint. The primary appendicular peritonitis may in like manner be continued into the tissues behind the cæcum, and thus a secondary paratyphlitis or perityphlitic abscess be occasioned. So various are these possibilities that every case of so-called perityphlitic abscess must be regarded as primarily one of a perforating appendicitis unless proven to be the contrary.

With the frequent eventual destruction of the peritoneal wall of the abscess is the possibility of death from hemorrhage. Conant[4] describes the case of a young man who died at the end of three weeks. There was no general peritonitis, but the abscess communicated with the cæcum (the appendix being destroyed) and held a pint of clotted blood. Fatal hemorrhage from ulceration of the deep circumflex iliac artery is recorded by Bryant.[5] This case is not unlikely to have been one of appendicitis, although the condition of the appendix is not stated. Again, Powell[6] reports a case where the appendix was adherent to the internal iliac artery, the cavities of the two being in communication. The colon and cæcum were distended with gas and dark blood.

The occurrence of disease of remote parts may be alluded to, as abscesses of the liver from pylephlebitis or portal embolism in consequence of a mesenteric thrombophlebitis near the appendix. The affection of the liver and portal vein may be the result of a direct continuance of the phlebitis, or may follow putrid embolism from a thrombus in the immediate vicinity of the appendix. The extension of a secondary paratyphlitis may cause perforation of the diaphragm with a consecutive pleurisy or pericarditis.

In considering the symptoms of appendicitis, it is to be noted that attacks of inflammation frequently occur without giving rise to any

[1] N. Y. Med. Record, 1875, x. 267.
[2] Am. Journ. Med. Sci., 1881, lxxxi
[3] British Med. Journ., 1884, ii. 43.
[4] Lancet, 1864, ii. 514.
[5] Am. Med Monthly, 1858, x. 359.
[6] N. O. Med. and Surg. Journ., 1855, xi. 468.

characteristic symptoms, and often without a suggestion of any distinct malady.

A comparison of the results of post-mortem examinations with the records of the previous histories of patients justifies this statement, unless it be urged that the disease occurred so early in life as to have been unappreciated or forgotten. Out of 227 cases of perforated appendix, however, 22, about 10 per cent., were under the age of ten years. This number is far too small to account for the occurrence of evidences of disease of the appendix in more than one out of every three autopsies.

The records of the Massachusetts General Hospital state that an individual with an appendix a half inch long, thickened, curved, and intimately adherent to the thickened and opaque subjacent peritoneum, never had symptoms of inflammation in this region. Another patient was never sick before his fatal illness, although the appendix and cæcum were closely united to the neighboring parts by old fibrous adhesions, and the canal of the appendix was obliterated. Still another patient was always well and strong till within eleven days of his death, yet the appendix was converted into a solid fibrous band intimately united by firm adhesions to the posterior wall of the cæcum. The severity of these lesions suggests the probability that apparently slight disturbances of digestion were overlooked. The diarrhœa, constipation, or abdominal pain, especially when occasionally recurrent, were regarded as characteristic of a feeble digestion. There can be but little doubt that a diagnosis of bilious attack, colic, gastritis, enteritis, gravel, ovaritis, congestion of the womb and the like, may not unfrequently conceal the existence of an inflamed appendix.

The latency of the symptoms in certain cases of appendicitis is such that the eventual diagnosis is obscured, and the desirable method of treatment hopelessly postponed. Buck[1] reports that a sailor was at work rolling barrels of flour till the day of his admission to the hospital. He then had a prominent iliac tumor extending along the outer half of Poupart's ligament. Fluctuation was transmitted from it to below the inner half of the ligament. Another sailor left Portland for New York, April 12, 1886, and arrived five days later. In the meantime he purged himself in consequence of a right iliac pain. Although suffering, he kept at work during the following week. He then left for Boston, where he arrived on the thirteenth day after the beginning of the pain. Symptoms of general peritonitis were evident, and he died the next day, General peritonitis was present, the result of an encysted inflammation about the appendix. This organ formed a gangrenous slough lying in the cavity of the abscess.

[1] New York Medical Journal, 1866, ii. 40.

The latency as well as the frequent obscurity of the symptoms of appendicular inflammation are thus apparent. The presence, therefore, of the symptoms now to be mentioned, in individuals from whom the history of one, and particularly of several such attacks is to be obtained, is of marked importance in aiding diagnosis.

Sudden, severe abdominal pain is the most constant, first, decided symptom of perforating inflammation of the appendix. It occurred in 216 out of 257 cases, 84 per cent. In most instances it is present in apparently healthy individuals, in a few it follows an attack of diarrhœa.

The pain is usually intense, rarely slight, and is occasionally accompanied by a chill, or nausea and vomiting.

The following table shows its localization in 213 cases of appendicitis, and, by way of contrast, in 92 cases of typhlitis and perityphlitis:

	Appendicitis.		Typhlitis and perityphlitis.	
	Cases.	Per cent.	Cases.	Per cent.
In right iliac fossa . .	103	= 48	55	= 60
" abdomen . . .	76	= 36	31	= 34
" hypogastrium . .	11	= 5	0	
" umbilical region . .	9	= 4	2	= 2
" epigastrium . . .	4	= 2	4	= 4
" stomach . . .	3	= 1	0	
" hepatic region . .	3	= 1	0	
" left iliac fossa . .	3	= 1	0	
" right hip and groin .	1	= ½	0	
Total . . .	213		92	

It is quite probable that the number of cases of more exactly localized pain would have been considerably greater had attention been specially directed to this point. Many of the recorded cases of abdominal and hypogastric pain would undoubtedly have permitted a more definite localization, especially as firm pressure often discloses a sensitive spot at some distance from the referred seat. Though usually limited to the fossa, the pain sometimes extends upward as far as the liver, or downward to the rectum, testicle, perineum, or thigh. The attack is occasionally associated with great nervous anxiety, and is at times followed by marked prostration, from which the patient rallies in the course of a few hours.

This sudden intense pain is presumably due, not to the actual beginning of the disease, but to the separation of the fresh adhesions of an acute appendicular peritonitis, and often, perhaps usually, to the perforation of the inflamed appendix. It generally represents the beginning of a more extensive peritonitis. An attempt has been made to ascertain the date of occurrence of this most important symptom. This was

possible in 61 cases of appendicitis, and in 64 cases of typhlitis and perityphlitis. It occurred as follows:

	Appendicitis. Cases.	Per cent.	Typhlitis and perityphlitis. Cases.	Per cent.
On the 1st day in . .	41	= 67	48	= 75
" 2d " . .	5	= 8	10	= 16
" 3d " . .	12	= 20	2	= 3
" 4th " . .	2	= 3	4	= 6
" 5th " . .	1	= 2	0	
Total . . .	61		64	

If the pain is not accompanied by nausea and vomiting, these symptoms are not unlikely to follow. Their occurrence is recorded in 15 cases of appendicitis, and in 44 out of 209 cases of typhlitis and perityphlitis. The vomit quickly becomes green in color, but in general this symptom is not distressing at this stage of the disease. Diarrhœa is rarely present, while constipation is the rule.

The abdominal pain is followed by fever as the next constant symptom. The date of its appearance is noted in but 38 cases of appendicitis, and in only 16 of typhlitis and perityphlitis. It was present

	Appendicitis.	Typhlitis and perityphlitis.
On the 1st day in	5 cases.	6 cases.
" 2d "	18 "	7 "
" 3d "	9 "	0 "
" 4th "	6 "	3 "
Total	38 "	16 "

The temperature is rarely very high, and the constitutional disturbances usually associated with an elevated temperature are frequently slight, if not absent. The maximum recorded in the cases here collected is 103.5° F., but the range is usually between 100° F. and 102° F. With[1] noticed an elevation of nearly 106° F. If violent or extreme changes take place, a complication may be expected, as an abscess of the liver, or a pleurisy from an extension of the local inflammatory process.

During the first three days following the onset of the pain, micturition is occasionally disturbed. Perhaps unusually frequent on the first day, it is likely to be difficult on or after the third day. In certain instances the use of the catheter is required. A satisfactory explanation of this latter feature is to be found in the abundant use of opium, usually necessary at this stage of the disease. The right testicle may be retracted and swollen, in which case the course of the pain is apt to be toward this gland.

The circumscribed swelling in the right iliac fossa now demands con-

[1] Loc. cit.

sideration. This symptom, when present, is evidently of the utmost value in diagnosis, as its appropriate treatment most favorably modifies the prognosis. The swelling represents the accumulation of the increasing exudation, at the outset the product of the peritonitis, and lies beneath the adherent coils of intestine which later become attached to the abdominal walls. Its usual seat is in the right iliac fossa, below a line extending from the anterior superior spine of the ilium to the navel, nearer the former and two finger-breadths above Poupart's ligament. It may lie nearer the median line or may approximate the iliac crest. The swelling may be found in the pelvis in those cases where the appendix becomes attached to the peritoneum of the pelvic wall. It is rare for the primary swelling to be paracæcal, although this variety occurs where the appendix lies embedded behind the cæcum.

The early products of the peritonitis are largely cellular and fibrinous; scanty, opaque, greenish masses are found encapsulated. This condition is obviously not to be recognized by physical signs. As the liquid exudation increases, dulness becomes apparent. This sign may be obscured by intervening and adherent coils of intestine, especially if they are distended with gas, when a superficial gurgling may be recognized. Again the contents of the abscess may be partly gaseous, a condition more likely to occur later in the course of the disease. A circumscribed resistance is felt on palpation. As the part is often extremely sensitive to pressure and the abdominal muscles tense, the administration of ether or chloroform may be necessary to confirm the diagnosis. A rectal examination not infrequently permits the recognition of the tumor which abdominal palpation fails to disclose, and should always be made in the latter event. Owing to the position of the abscess beneath the transversalis fascia, and to the fact that it is often covered by adherent coils of intestine, a sense of fluctuation is rarely perceived till much later in the history of the case.

The clinical characteristics of the tumor and its composition are thus made evident by modified resonance on percussion, circumscribed resistance on palpation, and a sense of fluctuation. Notwithstanding the importance of these signs, the records of 257 cases of appendicitis give comparatively little information with reference to the date of their appearance. The 209 cases of typhlitis and perityphlitis give a more satisfactory result.

Dulness was first noticed on the

	Appendicitis.	Typhlitis and perityphlitis.
1st day in	0 cases.	2 cases.
2d "	2 "	0 "
3d "	1 "	7 "
4th "	4 "	5 "
5th "	1 "	2 "
6th "	2 "	0 "
7th "	1 "	1 "
8th "	1 "	4 "
9th "	0 "	1 "
10th "	0 "	3 "
Total	12 "	25 "

Palpation showed the presence of the tumor on the

	Appendicitis.	Typhlitis and perityphlitis.
1st day in	1 case.	4 cases.
2d "	3 "	6 "
3d "	4 "	8 "
4th "	2 "	8 "
5th "	4 "	3 "
6th "	5 "	6 "
7th "	4 "	4 "
8th "	1 "	7 "
9th "	0 "	11 "
10th "	0 "	11 "
Total	24 "	68 "

An attempt has been made to determine the date at which fluctuation becomes evident. As a rule, its appearance is so late in the course of the disease (after the second week) as to be of little diagnostic value. An exploratory puncture with the needle of the aspirator is frequently recommended to determine the nature of the tumor. Too much stress is not to be laid upon this method of examination. If the aspirator fails to show the presence of pus, even after repeated punctures in divers spots, it by no means follows that pus is absent. Operators have frequently exposed the transversalis fascia over the tumor and have then punctured it in several places. Pus not appearing, the wound has been dressed. In the course of a few hours an abundant discharge of fetid matter has made its appearance in the dressings and at the bottom of the wound.

It is evident from the consideration of the above table, that the presence of the abscess may be expected as early as the third day. It may be large enough to contain some three pints of fluid on the fifth day. The following case reported by Peckham[1] apparently justifies the above conclusions.

[1] Boston Med. and Surg. Journ., 1882, cvi. 159.

His patient was a man of t[illegible]seven years of age, who had suffered from abdominal pain and diarrhœa for twenty-four hours. He was then seized with a severe pain in the right iliac fossa, which was fuller than the left, tender, and dull. On the following day the whole abdomen was tender, but there was no complaint of pain. The day after, there were great tenderness, dyspnœa, cold hands and feet. The next day, the fifth of the disease and the fourth from the occurrence of the right iliac pain, the patient died. There was acute peritonitis. In the lower part of the abdomen was a space bounded by the bladder, iliac bones, and small intestine, the latter pushed up and covered by false membrane. In the cavity were nearly three pints of fetid, purulent fluid.

The chief danger from the appendicular peritonitis is that it becomes general. Many of the records mention the time of occurrence, not only of the iliac pain, but also of the subsequent general abdominal pain. The latter is to be regarded as suggestive evidence of the beginning of a general peritonitis, as the former calls immediate attention to the exact nature of the disease. The date of its occurrence is recorded in about one-fourth of the cases of appendicitis, most of which were fatal, while it is noted in but about one-tenth of the cases of typhlitis and perityphlitis, which were nearly all instances of recovery.

General abdominal pain was present on the :

	Appendicitis.	Typhlitis and perityphlitis.
1st day	2 cases.	0 cases.
2d "	11 "	6 "
3d "	21 "	8 "
4th "	12 "	4 "
5th "	8 "	0 "
6th "	5 "	1 "
7th "	5 "	0 "
8th "	4 "	0 "
9th "	2 "	0 "
11th "	3 "	0 "
Total	73 "	19 "

In one of the cases in which this symptom appeared on the first day death occurred on the fourth day. It was stated that there was no perforation of the appendix, although this structure presented a deep purple color and contained a fecal concretion. General peritonitis was present and a considerable quantity of pus was found in the pelvis and vicinity of the appendix. In the other case the general abdominal pain came on three hours after moderate pain in the bowels. It radiated from the right iliac region. In sixty-six hours the patient was dead. The intestines were glued together by a butter-like lymph, but there was no serous or sero-purulent exudation.

It was thought desirable to ascertain the date at which tympanitic distention of the abdomen appeared. At the same time it is recognized that this sign of a general peritonitis is of considerably less value than that already stated.

Tympanites was present on the

	Appendicitis.	Typhlitis and perityphlitis.
1st day	0 cases.	1 case.
2d "	7 "	5 cases.
3d "	13 "	8 "
4th "	14 "	2 "
5th "	3 "	2 "
6th "	1 "	1 "
	38 "	19 "

The second, third, and fourth days are those which include the largest number of cases of beginning general peritonitis. In sixty per cent. of the cases of appendicitis, as inferred from the nature of the pain, and in nearly ninety per cent. as suggested by tympanites. The source of this early peritonitis is to be found in most instances in the escape into the peritoneal cavity of the inflammatory product encysted near the appendix. Although usually small in quantity at this early period, its quality is exceedingly acrid.

The speedy death of the patient almost invariably results from the occurrence of the general peritonitis. In 176 cases the day of death was as follows:

On the 2d day	in 8 cases	= 4 per cent.		
" 3d	" 20 "	= 11 "		
" 4th	" 12 "	= 7 "		98 in the 1st week, 56 per cent.
" 5th	" 20 "	= 11 "		
" 6th	" 16 "	= 9 "		
" 7th	" 22 "	= 12 "		
" 8th	" 21 "	= 12 "		
" 9th	" 10 "	= 6 "		
" 10th	" 8 "	= 4 "		54 in the 2d week, 31 per cent.
" 11th	" 6 "	= 3 "		
" 12th	" 4 "	= 2 "		
" 13th	" 4 "	= 2 "		
" 14th	" 1 "	. . . . .		
" 15th	" 3 "	. . . . .		
" 17th	" 1 "	. . . . .		8 in the 3d week, 4 per cent.
" 18th	" 1 "	. . . . .		
" 19th	" 1 "	. . . . .		
" 20th	" 2 "	. . . . .		
In the 4th week	7 "	= 4 "		
" 5th	" 4 "	= 2 "		
" 7th	" 4 "	= 2 "		
" 8th	" 1 "	= ½ "		

In fatal cases sixty-eight per cent., more than two-thirds, die during the first eight days, and two-thirds of these die between the fourth and eighth days inclusive.

Errors in the diagnosis of appendicitis have been numerous, chiefly because the cardinal symptoms of localized pain, general heat, and circumscribed swelling have not been duly appreciated in their defined sequence. Again, the extreme rarity of acute perforating inflammation of the cæcum, as compared with that of the appendix, has not been made sufficiently conspicuous. The acute form of perforating appendicitis has been confounded with inflammation of the cæcum or typhlitis in an exact sense, intestinal obstruction from intussusception or strangulation, pelvic peritonitis (hæmatocele) of vesical, ovarian, tubal, or uterine origin, psoitis, and renal or biliary colic. More rarely a movable kidney or a foreign body in the badder has been suspected.

The chronic appendicular peritonitis and the chronic paratyphlitis resulting from a perforated appendix, have been confounded with the results of caries of the spine and hip-joint, suppurative nephritis, intestinal tuberculosis, and cancer of the cæcum. An appreciation of the previous history of the patient, the seat and character of the pain, the period of occurrence of the fever and the date of the appearance of the tumor are necessary for an eliminative diagnosis.

A primary perforating inflammation of the cæcum is extremely rare even in chronic dysentery or in chronic tuberculosis. In an extensive research into the literature of the subject but three cases of acute primary perforation of the cæcum have been found. One from a fish-bone, another from a pin, and the third from strangulation of the bowel. Two cases of rupture of the cæcum are recorded. So rare is the affection in question that the possibility of a primitive, perforating cæcitis may be disregarded. Bartholow's[1] communication on this subject relates rather to the secondary perforation of the cæcum from without.

Stercoral cæcitis, on the contrary, is exceedingly common, and is, perhaps, the most important of all the conditions with which the perforating appendicitis may be confounded. The history of this affection usually makes evident a period of protracted constipation in a person not especially young, vigorous, and apparently healthy, who may have had similar attacks. The pain is trifling for a long time, and the sensitiveness slight. Fever is absent, or of late occurrence. The tumor is present at the beginning as a distinct nodular or doughy mass, elongated, and in the lumbar region. It is unnecessary to say that from a stercoral cæcitis may arise a perforative appendicitis which may end in perforation. Many of the so-called cases of typhlitis terminating in resolution, associated with fecal retention, and persisting after the removal of the feces, are undoubtedly of this nature.

[1] American Journal of the Medical Sciences, 1866, N. S., lii. 351.

Intestinal obstruction from intussusception or strangulation is characterized by the frequent absence of a suggestive previous history. The pain is not so localized or intense, and the fever is not conspicuous at an early stage. The abdomen is distended and tympanitic at the outset, and is, at the same time, unusually sensitive. Borborygmus and perceptible movements of the intestine are associated with or followed by fecal vomiting. Obstinate constipation and the retention of flatus are noticeable. The tumor is absent when the intestine is strangulated, and it is elongated, sausage-like, usually following the course of the colon when intussusception is present. Tenesmus and the rectal discharge of bloody mucus are important signs of the latter affection, though they may occur when the appendix is inflamed.

As four-fifths of the cases of appendicitis occur in males, and as pelvic peritonitis suggests a doubt as to its diagnosis almost invariably in females, it is evident that the question of sex is of eliminative value in certain cases. But the doubt may arise in the case of the female. Barker[1] has reported two cases, the one of hæmatocele, fatal in forty-eight hours, diagnosticated as inflammation of the appendix. The second patient also died on the second day; the autopsy showed an inflamed appendix and pregnancy, although the patient wns supposed to have had a hæmatocele. Suppressed catamenia and the incipient symptoms of appendicitis not infrequently coexist. Again, the occurrence of symptoms of appendicitis within twenty-four hours after delivery is occasional, and more rarely it represents a cause of abortion. In general, the symptoms and progress of a pelvic peritonitis of pelvic origin would not be likely to suggest an inflamed appendix. The symptom which is of the greatest value in determining the onset of an appendicitis after delivery, is to be found in the rapid development of the tumor without an obvious cause. When the appendicular peritonitis is pelvic in its localization, the previous history and the absence of evidence of disease of the genital tract are to be relied upon to direct attention to the appendix as the cause.

An inflammation of the psoas muscle may be the result of an appendicitis. If due to other causes, and acute in character, the digestive disturbance is lacking, and the pain and sensitiveness are less, the tumor is more vaguely defined and tympanitic from its deep seat, while the motion of the leg is early impaired. A primary, acute, suppurative process is of doubtful occurrence.

A biliary colic is rarely likely to suggest an inflamed appendix. The seat and nature of the pain, the absence of fever and peritonitis during the first week, and the possible occurrence of jaundice, would tend to eliminate this affection.

[1] New York Medical Record, 1880, xviii, 663.

In the passage of a renal calculus the seat and character of the pain differ. Fever and the iliac pain are absent. There is no iliac tumor, and the examination of the urine may indicate the probable presence of a foreign body in the ureter.

In chronic cases of inflamed appendix the abscess is evident, and its treatment apparent. It may be mistaken for a psoas abscess of spinal origin. If the latter affection is present, evidence of disease of the vertebræ is usually to be obtained. In disease of the hip-joint the impaired mobility and localized sensitiveness of this articulation will be found more extreme than is apparent in the flexed and adducted thigh, usually connected with a chronic perityphlitic abscess.

The history of the cases of intestinal tuberculosis, chronic suppurative nephritis, and cancer of the cæcum are sufficient to eliminate these causes of iliac and lumbar tumors, when disease of the appendix is under consideration.

Perforating inflammation of the appendix sometimes proves fatal from shock. Death usually follows from the production of a general peritonitis by the direct extension of an appendicular peritonitis, or by the rupture of adhesions producing an intervening, encysted, peritoneal abscess. A general peritonitis may also occur by the intervention of a mesenteric thrombophlebitis and its continuance to the portal vein and liver, with or without portal embolism. Among the 257 cases of perforating appendicitis are 11 of pylephlebitis.

In the protracted cases death may result from exhaustion. Shock proves fatal within the first two days, death from an extended peritonitis within the first week, and from a secondary general peritonitis, as a rule, during the first two weeks.

The termination in resolution of a perforating appendicitis undoubtedly occurs, but our present sources of information give no absolute evidence as to the relative proportion of this class of cases to those ending fatally. The consideration of a large number of cases of typhlitis and perityphlitis, offers a suggestion as to the possible frequency. Of 180 cases thus designated there terminated

By resolution	58	= 32 per cent.
Spontaneous evacuation	33	= 18 "
Operation	89	= 50 "
	180	

It will be generally admitted that the spontaneous evacuation of a perityphlitic abscess is an event to be anticipated and guarded against. Apart from the consequent dangers which may result, possible fatal complications which may precede the time of its expected occurrence are a sufficient warning. It is, therefore, important to bear in mind that two-

thirds of the cases of typhlitis and perityphlitis above tabulated, were of unquestioned abscess.

The termination by resolution of nearly one-third may seem a sufficient warranty for recognizing this result as frequent enough to be anticipated in all cases.

That this conclusion is not justified appears from the fact that twelve of these, about one-fifth of the entire number, thus terminated at the end of the second week. Operative interference is demanded before this time in two-thirds of all cases, hence but one-fourth may be expected to undergo resolution.

An additional argument against the plan of waiting with the hope of the occurrence of resolution, is to be found in the frequency of recurrent attacks. Recurrence is recorded to have taken place in 28 out of 257 cases of appendicitis, and in 23 out of 209 cases of typhlitis and perityphlitis; that is, in about eleven per cent. of each. It is at least suggestive of the importance of not waiting too long for resolution, that the number thus terminating during the last two days of the second week is seven per cent. of those ending in resolution. This number may include a considerable part of the recurrent cases which operative interference would have prevented.

The possibility of a termination by resolution must be recognized, and the earliest therapeutic efforts should have this result in view; especially as these efforts also tend toward localizing the peritonitis. But, as Pepper[1] states, "the unjustifiable delay permitted in many cases of typhlitis, whilst hoping day after day for the more definite detection of suppuration, is the direct cause of many avoidable deaths."

To keep the bowels quiet should be the first and last thought. Absolute rest in bed, liquid diet in small quantities often repeated, and, above all, sufficient opium to neutralize pain. A sufficiency may seem enormous. Pétrequin[2] gave a grain of opium every hour till the pain was relieved, with the result of administering 107 grains in six days. Clark[3] gave a boy, fourteen years old, 1350 drops of laudanum in one day.

A cathartic or a laxative may be demanded by the patient or friends, and an enema be thought desirable as a diagnostic aid. It is to be remembered that these may be the means of at once exciting a general peritonitis. With[4] states that in the milder cases the pain disappears in a few days, vomiting ceases, and within five or six days tenderness and distention disappear. The bowels open spontaneously a few days after the discontinuance of the opium. They may remain bound for twenty-four days, yet the general health need not suffer. Recovery may pro-

[1] Ext. Trans. Med. Soc. of Penna., 1883.
[2] Gaz. Méd. de Paris, 1837, 2me S., p. 438.
[3] Amer. Med. Times, 1861, iii. 253.
[4] Loc. cit.

ceed quietly, steadily, and without disturbance, and the appetite return long before the bowels are opened.

If, after the first twenty-four hours from the onset of the severe pain, the peritonitis is evidently spreading, and the condition of the patient is grave, the question should be entertained of an immediate operation for exposing the appendix and determining its condition with reference to its removal. If any good results are to arise from such treatment it must be applied early. Burchard[1] is an enthusiastic advocate of "lumbar typhlotomy in acute perforating typhlitis." No surgeon would hesitate to give this additional chance for life, were he satisfied that perforation had actually occurred and a general peritonitis was imminent.

If surgical interference is not instituted within the first twenty-four hours after the onset of the sudden and intense right iliac pain, to keep the bowels quiet must still be the injunction. The formation of the tumor, the circumscribing of the peritonitis, is then to be awaited. It is sure to form, in the large majority of cases, if the patient lives long enough. It is only in a small fraction that it occurs before the third day. In more than two-thirds of the cases the contents will escape externally or internally. Without surgical aid the escape is into the peritoneal cavity in most instances, with a rapidly fatal result. In a smaller number the escape elsewhere not infrequently produces serious if not fatal sequels.

Iliac abscesses were sometimes incised before the days of Dupuytren and Grisolle.[2] The latter writer recommended that they should be opened as soon as fluctuation could be detected, in opposition to the generally prevailing view that nature should take its course. It was left to Mr. Hancock,[3] however, to operate before this sign could be recognized. He advocated incision into the tumor in certain stages and forms of mischief, resulting from the presence of impacted feces or foreign substances in either the cæcum or its appendix, which have hitherto, for the most part, invariably proved fatal. He contended that the typhoid condition into which patients affected with peritoneal inflammation fell, did not depend upon the violence of the disease, but upon the effused fluid, the removal of which he thought the only chance of saving the patient. His reasons for operating in the given case are thus stated: "As she was evidently sinking, and the previous treatment had been of no avail, I proposed to make an incision from the spine of the ilium to the inner side of the internal abdominal ring over the hardened spot, so that if it were intestine or omentum it could be freed, or if, as was thought more probable, matter had collected in the right iliac fossa, it could be let out, and thus give our patient a chance for recovery."

[1] N. Y. Med. Journ., 1881, xxxiii. 1.
[2] Arch. Gén. de Méd., 1830, iv. 314.
[3] London Med. Gaz., 1848, N. S., vii. 547.

Some years later Lewis[1] contributed a paper on abscess of the appendix, which included an abstract of forty-seven cases, only one of which recovered. He referred to Hancock's communication, and urged the propriety of opening the tumor in case of threatening urgency even if fluctuation were absent. Willard Parker,[2] however, deserves the credit of having demonstrated the success of this operation in three out of four cases, and it is his advocacy of an early operation which has produced such favorable results since 1867. He thought surgery useless in the absence of adhesions, but opportune after the fifth day, when their presence is probable and the fear of rupture imminent. He considered that an incision made between the fifth and twelfth days was practicable, safe, and justifiable. Even when the diagnosis was doubtful, "if no abscess had already formed, in case one should be in process of formation, an external opening would tend to make it point in a safe direction, and if no abscess should form, a free incision would relieve tension, thus adding to the comfort of the patient and in no way prejudicing his safety."

In 1873 W. T. Bull[3] published an admirable paper on perityphlitis, based upon an analysis of sixty-seven cases thus designated. Thirty-two, nearly forty-eight per cent., terminated fatally, and in fifteen of these there was perforation of the appendix. Noyes,[4] in 1882, collected a series of one hundred cases of perityphlitis treated by operation, of which eighty were published after the appearance of Parker's paper. Of these fifteen died, fifteen per cent. of the whole. Even this greatly lowered mortality might have been diminished by excluding one case of cancer and another of phthisis. The almost invariable fatality, in Mr. Hancock's time, of cases not terminating in resolution has thus been reduced to less than fifteen per cent. by the general acceptance of a given operation under definite conditions.

In the table[5] which has been prepared to show the day of death in cases of perforating appendicitis, it appears that 60 out of 176 cases, 34 per cent., died during the first five days. This early mortality is sufficiently explained by the consideration of the table[6] of symptoms indicating the onset of a general peritonitis. It appears that of 73 cases of general abdominal pain, this symptom appeared during the first five days in 54 instances, 74 per cent. Tympanites was noticed during the same period in 37 out of 38 cases, or 97 per cent. It is thus evident that the earliest date fixed by Dr. Parker is too late to afford the possibility of relief in more than one-fourth of all the cases. But early as this date may seem, it has almost universally been the custom to postpone the time of operating till later in the course of the disease. The following table is based

[1] N. Y. Journ. of Med., 1856, i. 328.
[2] N. Y. Med. Record, 1867, ii. 25.
[3] N. Y. Med. Journ., 1873, xviii. 240.
[4] Reprint from Trans R. I. Med. Soc. for 1882-83.
[5] Page 337.
[6] Page 336.

upon the analysis of 87 cases of typhlitis and perityphlitis. The operation was performed

On the	3d	day in	1 case.	
"	5th	"	1 "	
"	6th	"	3 cases.	8 = 9 per cent.
"	7th	"	3 "	
"	8th	"	7 "	
"	9th	"	3 "	
"	10th	"	11 "	
"	11th	"	4 "	41 = 47 per cent.
"	12th	"	4 "	
"	13th	"	6 "	
"	14th	"	6 "	
"	15th	"	5 "	
"	17th	"	4 "	
"	18th	"	2 "	15 = 17 per cent.
"	19th	"	1 case.	
"	20th	"	3 cases.	
After 3d week		. . .		23 = 26 per cent.
				87

Hence, if the indications for operating justified the election of a date as early as the fifth day, they still more justify the choice of the third day.

The result has shown the wisdom of the former step, and the evidence here presented seems not only to warrant, but to demand the latter. It is evident that the operation to be performed is that of opening the abdominal cavity. It is, therefore, unnecessary to state that an act which twenty years ago might have added to the risks of the patient, may at the present time, when properly performed, be confidently expected to reduce them very materially.

That the incision of the tumor, in cases of perityphlitis, is even now frequently omitted, is apparent from the consideration of the cases of inflamed appendix recently recorded. Of 57 cases occurring, for the most part, during the past five years, there were signs of a tumor in 16; an operation was performed in only 7. The tumor was opened in 4 cases, twice successfully. Laparotomy was performed as a last resort in 3 instances, the diagnosis being intestinal obstruction; the cause of the peritonitis was not discovered, and death speedily followed.

Notwithstanding this evidence of a fatal delay in the appropriate treatment of cases of appendicitis, the tendency to the performance of an earlier operation is growing. Bull[1] states that he operated on the third day after the patient was seized with chill, fever, vomiting, and constipation. There were severe right iliac pain and increased resistance on pressure. The aspirator showed pus in the lumbar region, and an

[1] New York Medical Record, 1886, xxix. 267.

abscess was opened behind the colon. Death occurred two days later, and the autopsy showed a perforated appendix, paratyphlitis, and general peritonitis.

Barlow and Godlee[1] made an exploratory incision in the median line on the fifth day. They found early general peritonitis and lymph near the cæcum surrounding a collection of fetid pus, presumably of appendicular origin. A second incision was made over the latter. Recovery took place.

Homans[2] operated successfully on the sixth day of the disease, probably perforation of the appendix, and the second day after the patient was seen by his physician, Dr. Greene, of Dorchester. The incision was made into the abdominal cavity over the seat of pain. The adherent intestines were separated, and some two ounces of pus removed.

Keen[3] also operated on the sixth day after the occurrence of sudden, intense, right iliac pain. Although the symptoms had been characteristic, they were abating. There was increased resistance, however, dulness on deep pressure, a doughy sensation, and considerable œdema in the right iliac fossa. The aspirator showed pus, and a pint was removed after the abscess was opened.

The presence of a general peritonitis does not contraindicate the operation. The case of Barlow and Godlee shows that the general peritonitis may have begun yet the patient recover. Treves[4] operated upon a case of peritonitis of two days' duration, supervening upon an attack of pelvic peritonitis of some three months' standing. The patient recovered. Mikulicz[5] operated on the sixth day after the sudden right iliac pain in a case where there was evidence of rupture of the abscess into the general peritoneal cavity on the fourth day. The wound was closed, slight improvement followed, but death occurred on the eleventh day.

If the encysted peritonitis becomes general, death has heretofore been almost inevitable. It is thus obvious that if laparotomy was successful in two out of three cases where a secondary general peritonitis was present, there is more than a chance of recovery by its use even in hitherto necessarily fatal cases. But it should be employed only when suitable, and not as a last resort when patients are moribund.

In conclusion, the following statements seem warranted:

The vital importance of the early recognition of perforating appendicitis is unmistakable.

Its diagnosis, in most cases, is comparatively easy.

Its eventual treatment by laparotomy is generally indispensable.

[1] Medical Times and Gazette, 1885, ii. 852.
[2] Boston Medical and Surgical Journal, 1886, cxiv. 388.
[3] Medical and Surgical Reporter, 1886, liv 165.
[4] Medico-Chirurgical Transactions, 1885, 2d series, l. 175.
[5] Volkmann's Samml. klin. Vortr., 1885, ccixii. 2313.

Urgent symptoms demand immediate exposure of the perforated appendix, after recovery from the shock, and its treatment according to surgical principles.

If delay seems warranted, the resulting abscess, as a rule intraperitoneal, should be incised as soon as it becomes evident. This is usually on the third day after the appearance of the first characteristic symptom of the disease.

BACTERIOLOGY.

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(SECOND PAPER.)

Relations of Bacteria to the Soil on which they Grow.

We have already considered the conditions which favor or hinder the growth of bacteria, and we must now study their mode of nutrition and the changes which take place in the soil in which they are growing. This subject is an extremely complex one owing to the complexity of the chemical substances which are used as food, and the difficulty of ascertaining by analysis the precise changes which have occurred. Hence very little is as yet known about these matters, but there are certain facts which have been made out to which I must shortly allude.

There are two points which have to be considered in this connection, viz.: 1, the assimilation of nutriment by bacteria, the source of their energy, and their respiratory processes; and 2, the products of their growth.

1. As regards the sources of energy; while a small part comes from osmosis, by far the greater part is derived from the processes of intramolecular respiration, the breaking up of complex chemical compounds, probably chiefly of proteids, with the production of CO_2. Intramolecular respiration may go on with or without the presence of free oxygen, but where free oxygen is present additional energy is obtained from the oxidation of these compounds. In some circumstances, where sufficient energy is not obtained by the intramolecular respiration, changes occur in the nutritive media which do not stand in direct connection with the assimilative processes of the plant, viz., fermentative changes. In the absence of free oxygen the necessary energy is obtained, in many cases, from this fermentative process, and hence the meaning of the fact previously mentioned, that if bacteria are cultivated without oxygen they ought to be grown in a suitable fermentescible material.

The substances which exist in the nutritive material do not enter the

cells without change and then become broken up; they are first assimilated by the protoplasm and converted into compounds suitable for the further changes. In this process, as well as in the processes of growth, a large part of the energy is used up, for assimilation exceeds destruction; in other words, there are constant growth and new formation of protoplasm.

In the process of assimilation it is necessary for the nutritious substances to be in solution in order that they may enter the cells, and with regard to albumen, many bacteria excrete ferments which in the first instance peptonize the insoluble albumen, and thus render it fit for food. Very little is known with regard to the process of assimilation. With regard to the assimilation of carbon compounds, Flügge[1] says:

"At present only hypotheses are possible as to what is usually the first carbonaceous assimilation product. In the higher plants, which contain chlorophyll, starch is observed as one of the earliest products; in the lower fungi this is, however, apparently altogether absent, except in a few cases (only in some forms of bacilli and leptothrix). From the different nutritive values of the carbon compounds it may perhaps, according to Nägeli, be concluded that the first assimilation product is composed of three carbon atoms with which hydrogen and oxygen atoms are combined, and which are then united with another similar group of three carbon atoms to form a large molecule of six carbon atoms. The more nearly the nutritive materials approach this hypothetical composition, the less difficulty there is in their assimilation, and the more nutritive they are."

As regards the nitrogenous substances, they are usually increased in complexity of structure as the result of assimilation. This is more especially the case with the ammonium salts, which become combined with carbon. The mineral salts also appear to become combined with complex proteid molecules.

The assimilated materials in part go to form new protoplasm and are in part destroyed by the respiratory process.

2. Many of the products resulting from the vital processes of bacteria are of great importance on account of their relation to life and disease. Some of these products are common to all or a number of different bacteria, others are more or less confined to particular kinds. Flügge gives the following list of the chief products of bacteria:

"Gases, as CO_2, H, CH_4, H_2S, NH_3; water; sulphur; volatile bodies, such as trimethylamin, alcohol, formic acid, acetic acid, butyric acid; fixed acids, as lactic acid, malic acid, succinic acid, oxalic acid, tartaric acid; sulpho-acids, as taurin, amides of the fatty acids, especially leucin, alanin, etc.; bodies of the aromatic series, as tyrosin, phenol, kresol; reduction products, as indol, hydroparacumaric acid; complex molecules, as carbohydrates, pepton, hydrolytic ferments; finally, coloring matters and poisonous alkaloid substances."

Of these, CO_2, the fatty acids, the amides, and certain aromatic bodies are products common to a number of different bacteria. Carbonic acid

[1] Fermente und Mikroparasiten.

is always given off by bacteria in the process of growth, either as a product of the intramolecular respiration or of oxidation and fermentation. Water and a nitrogenous body are also always present as excretory products. Phenol and other aromatic bodies occur chiefly, and perhaps only, in connection with putrefactive processes.

Among the various results of the growth of bacteria we may refer in detail to three which are of great importance: 1, the production of pigments; 2, the formation of ptomaines; and, 3, the various fermentations.

1. A large number of pigment-forming bacteria are now known, belonging chiefly to the groups of micrococci and bacilli. The color is generally developed only in contact with air; if the bacteria are growing partly in contact with air and partly away from it, the pigment is, in most cases, seen only where the air penetrates. This is easily seen on inoculating a tube of meat jelly with a pigment-forming organism (such as the pink Torula) by plunging an infected needle into the substance of the material. Growth occurs in most instances both at the surface and at the deeper parts of the needle-track; but it will be seen in the case of the torula, for example, that the color is most intense at the surface, and gradually becomes less and less marked the further away the growth is from the air.

The composition of these pigments varies much. Some are soluble in water, and if a fluid is used as a cultivating medium it becomes tinged throughout; others are insoluble in water, and remain in the gelatinous material which unites the bacteria into zoöglœa masses. As has been previously mentioned, the pigment is not usually present in the interior of the cells, but in some instances the cells appear to be tinged by it, as in *beggiatoa rosea-persicina*, in which the pigment (bacterio-purpurin) appears to be in part inside the cell.

As to the nature of these pigments, almost nothing is known. They seem to be allied to the aniline colors.

These bacteria grow and produce their pigment on a great variety of soils. Of these, the most universally suitable are bread paste and the surface of boiled potato. Cohn has shown that an albuminous soil is not necessary for their development, but that certain forms may grow and produce their pigment in artificial fluids (Cohn's solution) containing ammonia and a carbonate, but no trace of albumen.

The various colors are specific products of specific bacteria. The same bacterium always produces the same material under suitable conditions, and, so far as is known, the material is different in the case of each pigment-forming organism. The intensity and precise shade of the color of the pigment depend on several external circumstances. Reference has already been made to the fact that in many instances oxygen is neces-

sary for the development of the color. In other cases the reaction of the medium is of great importance. Thus the pigment of Micrococcus prodigiosus becomes yellowish when an alkali is added, but the red color at once appears when the material becomes acid. This difference of color, according to the reaction of the medium, is well seen in Bacillus cyanogenus (the bacillus of milk), where the blue color is only developed if the milk is acid. It is not, however, necessary, in most cases, that the reaction of the material should always be in the first instance that most suited for the development of the pigment. Thus Micrococcus prodigiosus produces its red pigment on soils which are not themselves acid. This is due to the fact that the micrococci not only produce a pigment, but also an acid. The following are some of the chief pigment-producing bacteria:

Micrococcus prodigiosus[1] is the one which is perhaps best known. It produces a brilliant blood-red color, and frequently appears on bread and other material containing starch, giving rise to the phenomenon of the bleeding host. It also at times grows in milk, which likewise becomes red; an appearance formerly referred to many causes, more especially to a diseased state of the cow, but in reality due to the growth of this organism in the milk after it leaves the body of the animal. The pigment is insoluble in water, and is present either in the glutinous material that unites the bacteria into zoöglœa masses, or in the substratum in which the organisms are growing; the cells themselves are colorless. It is soluble in alcohol and ether. Alkalies turn the color to yellow; acids produce a deep carmine-red tint.

Micrococcus luteus is a very common organism, and frequently appears in the form of yellow drops on the cut surface of boiled potato exposed to the air for a short time. This coloring matter is also insoluble in water, and is apparently contained in the glutinous connecting material.

A number of other micrococci which produce pigments are known, but beyond the fact of this pigment production, very little interest attaches to most of them. Such are *Micrococcus aurantiacus* (Schrœter), giving rise to an orange-yellow color, soluble in water. *Micrococcus chlorinus*, producing a greenish-yellow color, soluble in water; acid destroys the color; the material in which it grows becomes strongly alkaline. *Micrococcus cyaneus* (Cohn and Schrœter), causing an intense blue coloration, soluble in water; the color resembles closely that of litmus, and, like it, becomes red with acids, and blue with alkalies. *Micrococcus violaceus* (Schrœter), forming a violet color, also soluble in water. *Micrococcus fulvus*, producing a rusty-red color. In addition to these, are other unnamed micrococci which also produce pigment.

Various sarcinæ give rise to pigments. One, which liquefies gelatine,

[1] This organism ought really to be reckoned among the bacilli, but it has been so long known under the name "micrococcus" that it is perhaps better to retain that designation.

produces a golden-yellow pigment; another, which does not liquefy gelatine, gives rise to a citron-yellow pigment; and a third forms a delicate pink.

Certain pathogenic micrococci also produce pigment. Of these the chief are: *Staphylococcus pyogenes aureus*, giving an orange-yellow color; *Staphylococcus pyogenes citreus*, giving a citron-yellow color; and *Staphylococcus cereus flavus*, giving a yellow color.

Among the bacilli, also, a considerable number produce pigments. Of these the following may be mentioned: *Bacillus prodigiosus*, referred to already under the name *Micrococcus prodigiosus*. *Bacillus indicus*, which was found by Koch in the intestinal contents of a monkey in India; it produces a scarlet color, which becomes blood-red on the addition of ammonia, but regains its scarlet tinge when acetic acid is added. *Bacillus syncyanum*, commonly known as the bacillus of blue milk, which produces a grayish-blue coloring matter. Under the influence of its growth milk becomes of an indigo-blue color. When it grows in pure milk the latter becomes distinctly alkaline, and the color is a slate-gray or pale blue. If, however, the lactic fermentation is going on at the same time, or if acid be added, the intense deep blue color is obtained. For the production of this color, the presence of oxygen or oxidizing agents appear to be necessary. The source of the pigment seems to be, according to Hueppe's researches, the casein, and not the sugar. *Bacillus ruber*, which produces a scarlet color, like that of red sealing-wax. A bacillus is sometimes found in water which produces a beautiful dark violet color (*Bacillus violaceus*) in contact with the air. A dirty red color is also formed by *Bacillus erythrosporus* (Cohn), which is occasionally obtained from the air. *Bacillus pyocyaneus* is the cause of the blue pus occasionally seen in wounds. It produces a greenish-blue color. The pigment can be extracted from the pus by means of chloroform, and in neutral fluids gives a blue color. If the water is acid, the color is red. It thus resembles litmus, and the pigment is called by Fordos *pyocyanin*. Various other bacilli have been obtained from water and air, producing greenish, red, and fluorescing pigments. *Clathrocystis roseo-persicina* (*beggiatoa roseo-persicina*, Zopf; *Bacterium rubescens*, Lankester) produces a peach-colored pigment, investigated by Ray Lankester, and called by him *Bacterio-purpurin*. The pigment is insoluble in water and alcohol, and is apparently contained in the cells. The spectrum of this pigment, as described by Lankester, differs from that produced by the Micrococcus prodigiosus and other pigment bacteria. This organism is found in water in which dead animals are putrefying, in marshes, etc.

Some pathogenic bacilli also produce pigment when growing in various substances, especially on potato. Among these are the *bacillus of glanders*, which gives rise to brownish deposits on potato; *the cholera bacillus*, which, at the temperature of the human body, grows on potato

in the form of a grayish-brown layer; *Bacillus alvei*, which produces a yellow color; and the *bacillus of vagus pneumonia* (Jens Schou), the colonies of which on potato have a reddish hue.

Certain other closely allied forms of microörganisms also form pigment, of which may be mentioned various forms of Torulæ: a Torula producing a pink color in contact with the air, a black Torula, and a yellow Torula.

2. Much more important than these pigments are the alkaloid products formed by certain bacteria as the result of their growth in albuminous materials. These have, as yet, been but little investigated on account of the small quantity present and the difficulty of isolating them from the other materials in which they are found. It is only those which occur in putrefying materials which have been isolated, and it has not yet been ascertained what special form of bacterium produces each, or whether the same substance may result from the growth of different kinds of bacteria. It is, however, most probable that, just as in the case of the pigment bacteria, each species of bacteria always gives rise to the same set of products under suitable conditions. It has been long known (since Panum's classical researches) that putrefying materials often contain a chemical poison which, when introduced in sufficient quantity, kills certain animals. Panum found that where a large quantity of putrefying material was injected at one time into animals, death rapidly followed with symptoms of poisoning. To show that this result was independent of the growth of bacteria in the living body, he boiled the fluids for several hours, thus killing all the bacteria; nevertheless, the fluids retained their poisonous qualities, though not to such a degree as before this prolonged boiling. In another experiment he filtered the fluid, boiled it for an hour, evaporated to dryness, digested it with absolute alcohol, and then treated the residue with boiling water, when he found that this watery extract was also poisonous. Since that time various attempts have been made to isolate and analyze these poisonous bodies, but up till quite recently the results have not been satisfactory. Brieger has, however, succeeded in demonstrating the existence of a number of alkaloid substances in decomposing materials and in determining their chemical constitution. As this matter is of great importance, it will be necessary to give some details of Brieger's work.[1]

The name given to these bodies is *cadaveric alkaloids* or *ptomaines* (from πτῶμα, a corpse), and although this term was at first applied only to the bodies formed during putrefaction, more especially during the decomposition of corpses, it is now applied to all the basic alkaloid bodies produced by bacteria. In his early researches Brieger investigated the ptomaines formed during the decomposition of flesh, fish, cheese, and

[1] "Uber Ptomaine," von Prof. L. Brieger, 1885, and "Weitere Untersuchungen uber Ptomaine," 1885.

gelatine; in his "further investigations" he deals with the ptomaines found in decomposing human cadavers. These two researches were preliminary to the most important part of these investigations, on which, however, he only touches in these works, viz., the study of the special ptomaines formed by the different species of bacteria, more especially by the pathogenic forms.

Without going into details as to the methods adopted in isolating the various bodies, the leading processes used in his researches on the cadaveric alkaloids may be briefly indicated. Hydrochloric acid was first carefully added to the materials in order to convert the alkaloids into chlorides, in which form they are not easily destroyed This mixture was then evaporated to a thick syrup and the ptomaine chlorides extracted by means of absolute alcohol. The extract was evaporated and again extracted with absolute alcohol, and this process was repeated several times. In this way those bases which were not readily soluble in alcohol (such as neuridin) were obtained. To the alcoholic solution was then added an excess of an alcoholic solution of bichloride of mercury, and this mixture was allowed to stand for twenty-four hours. The precipitate formed was then boiled in a large quantity of water and filtered. Thus the peptones and albuminates which, after this treatment, were insoluble in water were entirely removed, while the compounds of mercury and ptomaines were soluble in boiling water. On standing, certain of the less soluble bodies (the cholin) crystallized out. By means of sulphuretted hydrogen the mercury was then removed from the solution and the ptomaine chlorides left behind in the fluid; this fluid was evaporated and the residue washed with alcohol, when some alkaloids were dissolved in the alcohol and others were left behind. The dissolved alkaloids were then obtained by the addition of platinic chloride, ptomaine platinochlorides being formed. The processes, however, vary for each base, so that it is not possible to go into details here on these matters.

From meat minced up, mixed with water and allowed to putrefy for five or six days, at the body temperature, several alkaloids can be extracted. The one present in largest amount is called by Brieger *neuridin*, and has the formula $C_5H_{14}N_2$. This body, as will presently be seen, is very constantly present in putrefying materials. It is not poisonous. It can be split into equal parts of dimethylamin and trimethylamin. From the fact that this decomposition shows the close relation of this substance to neurin, the name neuridin was chosen. After removal of the neuridin the remnant is found to be poisonous, and from this the poisonous base *neurin* has been extracted. Another material is also found under the same circumstances, viz., *cholin*. Neurin and cholin have been held by a number of authors to be identical bodies, but Brieger finds that they are different, and holds that neurin ($C_5H_{13}NO$)

is derived from cholin ($C_5H_{15}NO_2$) by the removal of a molecule of water from the latter as the result of the action of the putrefactive bacteria. On animals their effects are different, both of them producing symptoms like those caused by muscarin, but differing much in the dose, ten times more of the cholin chloride being required to kill animals than of the neurin chloride.

In decomposing fish (herring and torsk) neuridin was again found in large quantities, also a poisonous base closely allied to *æthylen-diamin* ($C_2H_4(NH_2)_2H_2O$), but afterward found to differ from it; further, *muscarin* ($C_5H_{15}NO_3$), a base previously found by Schmiedeberg and Koppe, and ascertained by them to be the poisonous agent in a disease of flies caused by fungi (*agaricus muscarius*), and a new non-poisonous alkaloid to which the name of *gadinin* ($C_7H_{17}NO_2$) was given. In putrefying cheese neuridin and trimethylamin were found. From putrefying gelatine were obtained neuridin, muscarin, and dimethylamin. From fresh brain, cholin and neuridin were obtained (but not neurin). Neuridin cannot be got from the other fresh tissues of the body.

Of the various bases found in putrefying materials (neuridin, neurin, muscarin, a body closely allied to æthylen-diamin, gadinin, trimethylamin, triethylamin, and dimethylamin), neuridin is the one which is most constantly present at the commencement of putrefaction. The formation of the others depends to a considerable extent on the materials employed; thus neurin was found only in decomposing meat; muscarin, gadinin, trimethylamin, and the body allied to æthylen-diamin occurred in putrefying fish, and dimethylamin only in putrefying gelatine and putrid yeast.

From decomposing human cadavers the following bodies were isolated: cholin, neuridin, cadaverin ($C_5H_{16}N_2$), putrescin ($C_4H_{12}N_2$), saprin ($C_5H_{16}N_2$), trimethylamin ($(CH_3)_3N$), and mydalein. Of these, cholin and trimethylamin are poisonous in large doses, but mydalein is intensely poisonous, and another base, which was not analyzed, is also noxious. Which of these bodies is present depends greatly on the stage of decomposition. In bodies kept in the cold for twenty-four to forty-eight hours only cholin was present. If the putrefaction had gone on for three days at a warmer temperature, there was less cholin, and neuridin had appeared. After seven days the cholin disappeared entirely, and neuridin and trimethylamin were present. In fourteen days to three weeks new bases were found, and neuridin could no longer be detected. These new bases are, cadaverin, which increases in amount as putrefaction goes on, putrescin, saprin, and the two poisonous bases mentioned before, viz., mydalein and the other unnamed one.

The part of these results which interests us most as medical men is that in which the presence of poisonous alkaloids among the products of bacteria is demonstrated. The poisonous bodies isolated by Brieger

were cholin, neurin, muscarin, a body closely allied to æthylen-diamin, trimethylamin, mydalein, and another body of undetermined composition.

Neurin chloride injected into the lymph-sac of a frog, in doses of two to five milligrammes, produces in two to five minutes a paralytic condition; the animal at first reacts on mechanical or chemical stimuli, and reflex action persists to a slight extent for some time. Immediately after the injection the heart beats a little more slowly and more energetically, gradually the relative length of diastole increases, the interval between the beat becomes longer, and arrest occurs in diastole. Atropia often restores the heart's action, and frogs under the influence of atropia generally withstand the action of this toxic substance. Large frogs react slowly, and recover if the dose is one milligramme, but two milligrammes always kill. Of the lower animals, cats are most easily affected. For rabbits the subcutaneous injection of a dose of 0.005 gramme per kilo. of the body weight is necessary to cause the symptoms of poisoning, and a dose of 0.04 gramme per kilo. is required to cause death. Its injection is followed by the appearance of moisture about the nostrils and upper lip, then by profuse salivation, and later by increased secretion from the nose and the lachrymal apparatus. The respirations are quicker and labored, but toward the end they become slower, irregular, and superficial. At first the heart's action is very rapid and strong, but it very soon becomes slow and weak, and the heart stops in diastole. There is often marked contraction of the pupils after subcutaneous injection. This effect is always produced by dropping the solution into the eye. There are increased peristalsis and constant passage of feces; also emission of semen and passage of urine. When fatal doses are employed, there are clonic contractions of the muscles, accompanied by great weakness of the extremities. Atropia is a very active antidote even at a late period, but it does not act as a prophylactic in the case of rabbits. If the poison is administered by the mouth, ten times more is required than by subcutaneous injection.

These symptoms are identical with those produced by muscarin which, likewise, causes in rabbits salivation and flow of tears, contraction of the pupils, profuse diarrhœa, emission of semen, and passage of urine, till finally the animals die with cramps.

Cholin chloride produces symptoms similar to those caused by neurin, but much larger quantities are required, 0.1 gramme per kilogramme of body weight being required to produce the same effect as 5 milligrammes of neurin chloride, and the fatal dose of cholin for rabbits is 0.5 gramme per kilo., or almost ten times the dose of neurin.

The base allied to æthylen-diamin is also poisonous, but is not so violent in its effects as neurin. Even after the injection of large doses into the lymph-sac of a frog there are no effects evident at first; after a time,

however, the animal may become lethargic but is easily roused. This is followed by increased respiratory action; the pupils dilate, and the animal dies in some hours without any special symptoms. The heart stops in diastole. In mice and guinea-pigs the effects are more marked. Within a short time after the injection of small doses there is profuse secretion from the nose, mouth, and eyes; dilatation of the pupil and exophthalmos. Then there is violent dyspnœa, which often lasts till the death of the animal several hours (sometimes twenty-four) after the injection. Small doses had no immediate marked effect on rabbits beyond a transient and slight salivation and increased frequency of respiration, but several of these animals were found dead after twelve to twenty-four hours.

The action of mydalein, which is also apparently a diamin, is very characteristic. Small doses injected into rabbits and guinea-pigs produce, very quickly, increased secretion from nose, mouth, and eyes, dilated pupils, injection of the vessels of the ear, rise of temperature of 1° or 2° C., and at times shivering. By and by, these symptoms pass off and the animal recovers. If large doses (about one-half of a centigramme) are injected into a guinea-pig, the effect is very violent and always ends in the death of the animal. The secretion from the organs provided with smooth muscular fibres is extremely profuse, the saliva and feces mingle so that the animal always lies in a wet mess, more especially as locomotion is interfered with. Exophthalmos occurs, the dilated pupils are difficult to examine on account of the secretion from the lachrymal glands (this secretion is white and turbid). When the action of the poison has reached its height the animal falls down, because first the hind and then the front extremities become paralyzed; there are fibrillary twitchings in the different groups of muscles; respiration becomes more and more labored and panting, at times the animal leaps up gasping for air, raises its head and then again sinks down and lies in its feces, making slight movements with its limbs. The temperature gradually falls, the movements become weaker and weaker, and finally the animal dies. On post-mortem examination the heart is found to have been arrested in diastole, the intestine and bladder are contracted, but otherwise there is nothing abnormal.

The other poisonous substance obtained from putrefying human cadavers caused increased intestinal peristalsis in guinea-pigs and rabbits which lasted several days, and, on account of the continued evacuations, led to great weakness of the animal. Beyond this, no abnormal effect was noticed.

Brieger mentions a few preliminary attempts which he has made to search for ptomaines among the products of pure cultivations of the pathogenic bacteria. These have not yet led to any definite result. Friedländer's pneumococcus breaks up carbohydrates into formic acid,

acetic acid, and ethyl-alcohol; Brieger's bacillus, which was obtained from human feces and which kills guinea-pigs, gives propionic acid as the chief product of its growth in grape sugar.

The typhoid bacilli give considerable quantities of ethyl-alcohol and small quantities of volatile fatty acids, more especially acetic acid. They break up grape sugar into lactic acid. Brieger was also able to obtain from their cultivations in meat infusion a new ptomaine, small quantities of which produced marked effects on guinea-pigs. There were slight salivation and increased frequency of respiration. The animals lost control over the muscles of the extremities and back, without, however, the occurrence of any true paralysis; the pupils become dilated and ceased to react to light. There was also profuse diarrhœa, and the animals died in twenty-four to forty-eight hours. On post-mortem examination the heart was found strongly contracted, the lungs hyperæmic, the remaining internal organs pale, the intestine firmly contracted and its walls pale. This substance was probably a ptomaine, but its exact composition was not definitely made out. From cultivations of Staphylococcus pyogenes aureus a new ptomaine was also obtained, which, however, was apparently not poisonous.

Not the least important of the results of the growth of microorganisms are the ferments and the products of fermentation.

A number of microörganisms produce small quantities of substances which act as ferments in the same way as ptyalin, pepsin, trypsin, etc., act. This substance, the so-called chemical ferment, gives rise to fermentative changes, a very small quantity of the ferment being capable of causing alteration in a large quantity of material. These ferments are necessary agents in the nutrition of many microörganisms, converting substances which are unsuitable for food into easily assimilable materials. Of these we must note more especially the diastatic and the peptonizing ferments. Diastase converts starch into glucose in faintly acid solutions. It is excreted more especially by the *Bacillus butyricus*. Invertin is produced constantly by the ordinary *Torula cerevisiæ*, and converts cane sugar into glucose (dextrose and lævulose). The common yeast plant cannot assimilate cane sugar, but nevertheless it grows readily in solutions containing it, this ferment being produced and rapidly converting the cane sugar into glucose, which is then easily acted on. Certain bacteria (*e. g.*, *Bacillus amylobacter*) produce ferments which convert cellulose into glucose, and others which convert milk sugar into the same substance. The peptonizing ferment converts albuminous substances into peptones and is produced by various bacteria, more especially by the putrefactive organisms. There are other ferments less frequently found, some of which act on fat, converting it into fatty acids and glycerine, others on amides, etc. In the case of the fermentation of urea a chemical ferment has been isolated as a product of the micrococci

which are apparently the causes of the ammoniacal fermentation of urine. These bodies appear to have a hydrolytic action; they enable the molecule acted on to take up one or more molecules of water and then cause it to split up into two or more complex molecules without undergoing any alteration themselves. There is, however, a limit to the amount of material on which they can act, diastase, for example, being able at most to convert 2000 times its weight of starch into glucose. Flügge gives the following hypothetical formula of the action of these bodies:

Diastase: $\underset{\text{(Starch.)}}{C_{24}H_{40}O_{20}} + 3H_2O = \underset{\text{(Dextrin.)}}{C_6H_{10}O_5} + 3\underset{\text{(Dextrose.)}}{C_6H_{12}O_6}.$

Invertin: $\underset{\text{(Cane sugar.)}}{C_{12}H_{22}O_{11}} + H_2O = \underset{\text{(Dextrose.)}}{C_6H_{12}O_6} + \underset{\text{(Lævulose.)}}{C_6H_{12}O_6}.$

Urea ferment: $\underset{\text{(Urea.)}}{CO(NH_2)_2} + 2H_2O = \underset{\text{(Ammonium carbonate.)}}{CO_3(NH_4)_2}.$

Differing from these chemical fermentations in many ways are the fermentations caused by many forms of bacteria. They result in much more extensive and continuous changes in the fermentescible material, these changes being, as a rule, only brought about by one special form of microörganism. In some cases, however, various different organisms set up a similar process, though there is generally only one form which acts to a very marked extent. How these changes are brought about is not known, and probably the process differs in different instances. In any case, there is no doubt that the changes are due to the growth of living organisms, and not, independently of the organisms, to oxidization, molecular change, etc., as was formerly supposed. The evidence in favor of this statement is so strong and so well known that it is unnecessary to discuss it.

Various views have been propounded at different times to explain the action of the microörganisms. It might, for example, be supposed that these plants act by producing hydrolytic ferments which split up the fermentescible material in the manner before described. The only instance, however, in which the existence of such a substance has been demonstrated is in the case of the ammoniacal fermentation of urine. This has been shown to be due to the growth of an organism in the urine —the *Micrococcus ureæ* (Cohn)—and not to the vesical mucus, as was formerly supposed. Musculus demonstrated that by adding absolute alcohol to ammoniacal urine, a precipitate was obtained which could be filtered and dried. This precipitate transformed urea into carbonate of ammonia.[1] These results have been confirmed by Lea, of Cambridge. According to Pasteur, the cause of the fermentation is not the production of a ferment, but the breaking up of the chemical compounds by the

[1] Bacteria, Magnin.

growing plants in their search for nutriment, more especially for oxygen. Again, one might suppose that the organisms while living in various substances feed on them, and the products of the fermentation may be either the portion of the food which has been rejected by them, or products formed in and excreted by the organisms. There is, however, a considerable amount of evidence that the changes often occur outside the cells altogether. Nägeli has pointed this out with reference to the frequent formation of acetic ether in connection with alcoholic fermentation. Acetic ether can only be formed when acetic acid and alcohol are both in the nascent state. As these bodies do not result from the growth of the same organism, but of different organisms, it follows that they combine outside the cells, and that therefore the acetic acid and alcohol are nascent—in other words, are being formed outside the cells. Nägeli's theory is that "fermentation takes place in this way, that as the result of the intramolecular activity in the protoplasm intense movements are set up, and that outside the cells there are chemical molecules which are set into active motion by these movements, so that breaking up of these molecules results."[1] In all probability fermentation occurs in different ways in different cases. In any case, the fermentative action is a process distinct from the intramolecular respiration, and goes on alongside of it. Hence in the resulting material there are found not only the products of the fermentation but also the products of the life of the plant, though the former are present in enormously larger quantities than the latter.

As to the chemical changes which occur in fermentation, Hoppe-Seyler (see Flügge) makes the following suggestion:

"In all cases carbonic acid is produced; for this, new combinations between carbon and oxygen are necessary, and these are rendered possible by the breaking up of the existing union between oxygen and hydrogen, carbon and hydrogen, and carbon and carbon. In the fermentation of formic acid, $H-C\begin{matrix}=O\\ \diagdown O-H,\end{matrix}$ the union between the oxygen and hydrogen atoms in the hydroxyl group, and also the union between the hydrogen and carbon atoms is broken, the free hand of the oxygen atom attaches itself to that of the carbon atom, the hydrogen atoms unite, and thus we have H_2 and CO_2. In a similar manner in all fermentations there is a wandering of the oxygen atom from hydrogen to carbon, the point of attachment of the oxygen atom to the carbon one being obtained by the dissolution of the union between carbon and hydrogen and carbon and carbon. In short, the group carboxyl is formed, while, on the other hand, reducing compounds of hydrogen with hydrogen or carbon with hydrogen appear. . . . Nevertheless, the wandering of the oxygen atom which leads to the breaking up of the molecule only occurs when the molecule is not too large in relation to the number of displaceable carbon atoms. If there are numerous carbon atoms in union with one another while only one OH group is present, as in many benzol derivatives, in the higher fatty acids, etc., which can go to form carboxyl, then no such change occurs in the molecule; on the other hand, this change is possible when there are several oxygen atoms which can form new carbon compounds, as in the fer-

[1] Quoted from Flügge, op. cit.

mentation of glucose, where three carboxyl groups are present in each molecule. In the case of acetic acid, fermentation only occurs with difficulty for this reason, and in propionic acid it is still more difficult, for here, as in formic acid, there is only one oxygen atom free to form a carboxyl group, while the molecule is decidedly larger than that of formic acid; on the other hand, fermentation occurs much more easily in the case of the oxyacids (glycocholic acid, lactic acid, etc.), because in these there is a second hydroxyl group, and thus a second displaceable oxygen atom. Consequently, the following are not fermentescible substances: carbonic acid, amines which contain no oxygen; further, the large molecules of the higher fatty acids and the benzol derivatives which are not rich in oxygen. On the other hand, the following must be fermentescible: the higher alcohols, the lower fatty acids down to propionic acid, the oxyacids, and the multibasic acids of the fatty series, the carbohydrates, and the proteids."

The first fermentative change which was demonstrated to be due to the growth of living organisms is the alcoholic fermentation of sugar. I have previously referred to experiments which showed that the unboiled juice of the grape could be preserved without undergoing fermentation if taken from the grape and kept with certain precautions. Pasteur's experiments led him to the following conclusions:

"The boiled juice of the grape never ferments when kept in contact with air which has been deprived of the germs suspended in it.

"Boiled grape juice ferments when a very small quantity of water is introduced, in which the surface of the grape and the branches of the vine have been washed.

"Grape juice does not ferment after the introduction of this water if the latter has been previously boiled and allowed to cool.

"Grape juice does not ferment when a small quantity of the juice taken from the interior of a living grape is added to it."

On the other hand, grape juice does ferment if certain microörganisms be introduced, the sugar being converted into alcohol, carbonic acid, and other products. The special organism which produces this change is the yeast plant, or Torula cerevisiæ. Other forms of torulæ also set up the change, though to a much less extent, as well as some of the lower fungi, such as the Mucor racemosus, when free oxygen is absent. The latter is, however, not a true fermentation, but rather the result of the intramolecular respiration of the plants. Cane sugar cannot undergo this fermentation; it must first be converted into dextrose and lævulose. This is done by means of the invertin formed by the torulæ.

The chemical change which occurs is much more complex than was at first supposed, because not only are alcohol and carbonic acid produced, but also small quantities of glycerine, succinic acid, and often traces of acetic acid, amyl-alcohol, etc. These by-products apparently also owe their origin to the torulæ, and show that the fermentative change is probably a very complex one. The fermenting fluid must not contain too much sugar, otherwise the torulæ cannot grow; thirty-five per cent. of sugar is said to be the highest limit. The growth and fermentation also cease when the amount of alcohol in the fluid has reached 12 to 14 per cent. Of the sugar broken up, 95 per cent. appears as alcohol and

carbonic acid, 2½ to 3½ per cent. appears as glycerine, and 0.4 to 0.7 per cent. as succinic acid.

The lactic acid fermentation is due to a small bacillus, the *Bacterium lactis* (Lister). These bacteria are very short, thick cells, about half as long again as they are broad; when unstained they seem to be oval bodies. They are generally arranged in pairs, sometimes they are in chains. They are constantly found along with a great variety of other microörganisms in milk got from a dairy, and they increase in number as the milk becomes sour. They have been separated from the other bacteria and cultivated pure in various infusions, in nutrient jelly, etc., and their introduction into sterilized milk is followed by souring and coagulation of the milk due to the lactic fermentation. Though this is the chief organism which causes lactic fermentation, a number of other organisms, such as the typhoid bacillus, produce small quantities of lactic acid when grown in solutions containing grape sugar. The *Bacterium lactis* can cause fermentation in solutions of cane sugar, and therefore it is supposed that it forms a ferment which transforms the cane sugar into glucose, but this ferment has not yet been isolated. The precise changes that occur in the glucose have not been made out. A very large proportion is converted into lactic acid, but beside lactic acid there is always the development of carbonic acid gas, and there are also other by-products which have not yet been thoroughly investigated. When a certain and not very large quantity of lactic acid has been produced, the growth of the organisms, and consequently the fermentation, ceases. But if chalk be added to the milk, the lactic acid is neutralized, lactate of lime being formed, and much larger quantities of lactic acid are obtained.

The butyric acid fermentation is also due to a bacillus which is longer and larger than the Bacterium lactis. Pasteur thought that these bacilli could only cause the butyric fermentation in the absence of free oxygen; indeed, he went further and thought that oxygen killed them. This is, however, not the opinion of more recent investigators, more especially of Hueppe. Hueppe finds that these organisms can grow in milk and set up fermentation under conditions which have nothing to do with the presence or absence of free oxygen, and that the conditions in relation to air under which they act in producing fermentation are precisely the same as those of other bacteria. If sterilized milk be inoculated with a pure cultivation of this bacillus and kept at the body temperature, in two days a clear, somewhat yellowish fluid may be seen under the layer of cream. This fluid increases in amount as time goes on. At the bottom of the vessel is the coagulated casein, but after a time this coagulum becomes dissolved and peptonized, and then further broken up by the bacilli. According to Fitz, after ten days fermentation in an artificial cultivating fluid containing 100 grammes of starch there are

formed 34.7 grammes of butyric acid, 5.1 grammes of acetic acid, 0.33 gramme of succinic acid, and 1 gramme of ethylic alcohol.

The facts as to the viscous fermentation of sugar are not so well known, but, according to Pasteur, the microörganism at work is a micrococcus. The fermenting fluids become viscous, so that they can be drawn out in long threads. The change which occurs is that the sugar becomes transformed into a form of gum, mannite, and carbonic acid. According to Flügge, 100 parts of sugar give 51.1 parts of mannite, 45.5 parts of gum, and 6.2 parts of carbonic acid, and he explains this change by the following formula:

$$\underset{\text{(Dextrose.)}}{(50C_6H_{12}O_6)} = 12\underset{\text{(Gum.)}}{(C_{12}H_{20}O_{10})} + 24\underset{\text{(Mannite)}}{(C_6H_{14}O_6)} + 12CO_2 + 12H_2O.$$

The alkaline fermentation in urine has already been referred to in connection with the subject of chemical fermentations. It is apparently due to a micrococcus (*Micrococcus ureæ*), and the breaking up of the urea into carbonate of ammonia and water seems to be the result of the action of a chemical ferment formed by these organisms. That this change is really dependent on microörganisms, and not on the bladder mucus, is shown by the experiments in which normal urine is taken from the bladder with precautions against contamination, this urine, though unboiled, remaining for an indefinite time unaltered. Among the most striking experiments in this direction are those of Cazeneuve and Livon,[1] of which the following is an example: Remove the urinary bladder from the body of an animal, dip it for a few seconds into paraffin at 100° C., so as to destroy any living organisms which may have fallen on its wall, then plunge it into paraffin at 45° C., so as to get a thicker coat, and then hang it up. Even after three days it will be found that the fluid which has exuded from the bladder into the paraffin cup is clear, acid, and devoid of organisms. Remove the cup and expose the bladder to the air for a few hours, then give it a new coating of paraffin at 45° C. (which will not kill the germs which have fallen on the bladder during the exposure), and leave it again for three days. The fluid outside the bladder will then be found to be ammoniacal and to contain organisms. Similar results were obtained when the urine had been previously rendered alkaline by the administration of soda or potash.

The acetic fermentation is the conversion of alcohol into acetic acid, and is brought about chiefly by a small bacillus which grows on the surface of the fluid and forms dense, compact zoöglœa masses. This organism develops best in fluids containing a small quantity (one or two per cent.) of acetic acid, and there must not be too much alcohol present (at most ten per cent.).

[1] Revue Mensuelle, 1877, p. 733.

The putrefactive fermentation is a very complex change, and one about which very little is known, except that it is caused by the growth of microörganisms in the putrefying material. Probably there are a number of different fermentative processes occurring singly or together, which are accompanied by the development of a putrid smell. Nor has much been made out as to the microörganisms concerned in the process. Pasteur's researches led him to the view that, when a substance putrefies, two classes of microscopic organisms are at work—the first, in point of time, abstracting the free oxygen from the material; and the second, which then appear, being unable to live in free oxygen, but nevertheless requiring oxygen for their growth, obtaining it from the chemical compounds present. The result of this extraction of oxygen is the breaking up of these compounds and the rearrangement of their elements to form new compounds which constitute the products of putrefaction. Later observations have thrown doubt on the accuracy of this theory, and the probability seems to be that the organisms which produce putrefaction act as well in the presence of air as do the other fermentative organisms. Rosenbach[1] has found three different organisms which produce a putrid odor, and one of these is, he thinks, the common agent in this change. This organism, which he calls *Bacillus saprogenes, No. 1*, was obtained in the first instance from the air of a hospital ward, and produces an intensely putrid odor. It is a comparatively large bacillus, often containing a spore at one end, and it grows readily in a number of media. If inoculated on a mixture of water and egg albumen, free access of air being permitted, it breaks up the albumen rapidly, the fluid becomes greenish-yellow, and when the flask is opened a horribly offensive odor is perceived. If cultivated without oxygen, it causes hardly any putrefactive change in the material. A second bacillus which Rosenbach obtained produces a somewhat different smell, and acts somewhat more vigorously in the absence of oxygen than does No. 1. Although there may be only one or two organisms which produce the foul smell of putrefying material, there is no doubt that a large number of different species of organisms take part in the whole process of the destruction of albuminous materials. Probably, also, the presence of plenty of oxygen leads to the rapid destruction of the foul-smelling products, and to the more rapid and complete oxidation of the material. Flügge suggests the following as the course of events in the putrefactive process: When bacteria gain access to a putrescible medium, they at first increase in number, often with the formation of peptonizing ferments. The soluble albumen formed by means of these ferments then undergoes decomposition, which most probably occurs in this way, viz., that amido-derivatives of the fatty series (especially amido-acids), nitrogenous bodies of the

[1] Microörganismen bei den Wundinfectionskrankheiten des Menschen.

aromatic series, sulpho-acids (taurin), and perhaps peptone-like bodies are formed. Probably the products which are first formed are rapidly broken up—*e. g.*, the amido-acids into ammonia and fatty acids, the latter being still further broken up by liberation of CO_2 into H and CH_4. Thus, for leucin the following fermentative change has been ascertained:

$$\underset{\text{(Leucin.)}}{C_5H_{10},NH_2,COOH} + 2H_2O = \underset{\text{(Valerianic acid.)}}{C_4H_9,COOH} + NH_3 + CO_2 + 2H_2.$$

In the case of tyrosin, also, one must suppose that it very quickly undergoes decomposition, as it is only found in considerable quantities at the commencement of putrefaction. According to Nencki, the following may be the change:

$$\underset{\text{(Tyrosin.)}}{C_6H_4,OH,C_2H_3,NH_2,COOH} = C_6H_4\begin{cases}CH=CH\\NH\end{cases}\underset{\text{(Indol.)}}{} + CO_2 + H_2O + H_2.$$

According to Baumann, tyrosin, when putrefying in the presence of oxygen, breaks up into hydroparacumaric acid, paroxyphenyl acetate, paracresol, phenol.

In the superficial layers of the earth, the organic material undergoes a process of decay which leads to the so-called "nitrification," nitrites and nitrates, sulphates and carbonic acid being formed. For this process a porous condition of the soil freely admitting air is necessary; if the soil is compact, putrefactive processes occur. In soil, also, from the decomposition of plants, humin appears, and, in marshes, CH_4.

(To be concluded.)

THE TENDON-JERK AND MUSCLE-JERK IN DISEASE, AND ESPECIALLY IN POSTERIOR SCLEROSIS.[1]

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Our recent researches[2] have, as we believe, given to symptomatology an enlargement as to certain nervous maladies. The present brief paper is an effort to apply what we have learned to a single disease—posterior sclerosis of the cord. This disease was chosen because we were able to gather readily for examination a representative group of cases, and also because its natural history descriptions, having come from masters of their art, are both definite and reasonably complete.

[1] Read before the Association of American Physicians, June 17, 1886.

[2] Physiological Studies of the Knee-jerk and of the Reactions of Muscles under Mechanical and other Excitants, Philadelphia Medical News, February 13 and 20, 1886.

The knowledge on which our reëxamination of muscular conditions in ataxia is founded is very recent. However unfamiliar it may now be, like much other medical knowledge it will soon become common property, if once it be recognized as useful.

It will be necessary to state sharply the facts and inferences on which our research rests, in order that a clear comprehension of the analysis of the muscular failures in ataxia may be obtained.

Nothing can be more valuable to the physician than to know clearly the relative readiness with which a centre acts, a nerve carries its mandates, or a muscle responds to various forms of excitation.

Whether a muscle acts rapidly and completely when the nerve-force, volitional or reflex, calls upon it, or is inert and slow and incomplete in moving, would probably be one of our best tests of local or general health. The analysis of the quality of muscular reaction escapes us, in a measure. It may not always do so.

It is possible, however, to test muscle and nerve states by the study of coarser agents, and of these there are but two—electricity and mechanical excitation. The first gives us information of value, but, strangely enough, is to be regarded as a ruder agent than the other, and in some ways inapplicable beyond a certain point.

The mechanical excitation of muscle began to have value when, in 1875, Westphal described the diagnostic use of what we now call knee-jerk, and what is usually known as tendon reflex.

That the knee phenomenon is a direct muscle response, and not a true reflex, is now little questioned.

In 1883 Jendrássik[1] showed that violent exertion, as lifting weights, clenching the fists, increased the response to a blow on the patellar tendon. No addition was made to this inviting discovery until we added a collection of facts, which are certainly of interest, and which seem likely to prove also valuable. We showed that the knee-jerk and like acts, from striking a stretched tendon, are the most refined means we possess of deciding as to the tone of a muscle; that wherever we can get such movements, as at the knee, ankle, elbow, and jaw, every distinct muscular exertion, even if as slight as winking, increases the jerk, if it be timed correctly.

Also every strong sensation on the skin, whether it be heat or cold, or hurt of any kind, at once gives increased responsive power to the muscle the tendon of which has been struck.

If we combine sudden exertion with violent sensations, like that caused by a rhigolene jet, or the faradic wire brush, the coincident knee-jerk equals that seen in spastic disorders.

What is familiarly true of the knee is also true of the elbow, where

[1] Beiträge zur Lehre von den Sehnenreflexen, von Dr. Ernst Jendrássik, Deutsches Archiv für klinische Medicin, vol. xxxiii. p. 175, 1883.

the biceps responds beautifully to a blow on its insertion tendon, and gives us an excellent test for the presence of ataxia in the upper limbs.

And now, as concerns the muscle itself, if we strike sharply with a percussion-hammer the belly of a muscle, the fibres shorten in response to the blow.

Coincident distant motions or sharp sensations at once reinforce the muscle act, and exaggerate the effects of the blow. This muscle act obeys the rules which apply to tendon-jerks.

Therefore, all forms of mechanical irritation of a muscle admit of these reinforcements. Such additions to muscular excitability disappear when the muscle is cut off from connection with the spinal centres.

Section of the nerves, or disease of portions of the cord, as in posterior sclerosis, ends all response to tendon jerks; whilst a blow on the muscle still evokes local motion in its tissue.

The explanation is not far to seek. A muscle moves when struck, because of its innate capacity to twitch when irritated, but it does not move when excited by a blow on its tendon, unless it has besides its own excitability a constant influx of tone-waves from spinal centres. These aids to motility are born of two sets of causes: 1st, the afferent impressions due to muscular metabolic changes, a constant source; and, 2d, the intermittent influx of like waves due to overflow on to its own spinal ganglia of the excess of nerve force arising from remote muscle acts or sensory impressions. Without the constant tone flood no tendon-jerks can occur, and hence this delicate response fails when the nervous arc is broken in its sensory or motor branch, or in their connecting centre, but increases with every coincident increase of tone.

The jerk from a blow on the muscle continues even after such ruptures, but both forms of response cease then to be reinforced by distant sensations or volitions.

A blow causes a muscle-jerk extending in both directions up and down, but not transversely beyond the area struck. In some cases of disease this reaction lessens or is lost, and this irregularly, not all over a muscle but in limited areas; as regards the stimulation of a blow, certain muscular regions respond better than others in health, the extensors better than the flexors, and naturally those parts near to the motor points of nerves. At the point struck, the muscle fibres may, in addition to their sudden contraction, rise somewhat slowly into a little hump or eminence which, unlike the instantaneous twitch, subsides slowly. This hump is best seen in thin and in feeble people, and in the muscles late in ataxia is sometimes unusually large and lasts longer than is common. As seen when the percussion-hammer strikes the thin and feeble chest muscles of the tubercular patient, it is familiar to most of us, but it is observable in some healthy muscles at all times. Dr. Buzzard long ago remarked, with his usual sagacity, on some of the direct muscular

reactions of nervous disorders, but although Erb and others have also given the matter attention, there are still wanting full and systematic studies of these reactions in connection with disease.

We have spoken so often of tone reinforcements, that it seems well to give some explanatory statement of what we mean by tone.

The very existence of this addition to the excitability of muscles has been doubted, but our own experiments leave us, we think, little possibility of indecision on the subject.

All over the body we find muscles which possess a variable amount of intrinsic capacity to shorten under the influence of nerve force, electricity, and mechanical excitation, as abrupt stretching or a blow.

From the spinal centres there is a more or less steady flow of nerve influence which is the final preparation for prompt muscle response to excitations.

One source is probably in the muscular chemistries. Some afferent force thus created reaches the cord by the sensory nerves of each muscle, and the current returns through the motor track and keeps the muscle ready to react. If we were to conceive of this as a sort of tuning of the muscle, a final preparation for ready reply to the will, it would perhaps be not remote from the truth.

There is another source of tone which needs no further demonstration. Remote muscle acts, or sensory stimulations also remote, at once increase the readiness of the muscle to react and numerically add to its power of motor response.

Clenching of the fist or chilling of the arm abruptly increases the knee-jerk.

This may be explained in various ways. We now hold tentatively that will-force does not confine itself to one channel in this case. Besides the needed stimulation of the hand centres, there is an overflow of gentler excitation which floods the whole spinal group of ganglia, and for the moment adds to the flow of toning influences which constantly prepare the muscle to move and increase its excitability. This is an abrupt addition to muscle tone, and hypothetically accounts for what we call reinforcements of knee- and muscle-jerks.

In childhood this overflow is competent to cause extensive movements when only one is willed, until, as we grow older, the constancy of habitual effort creates a growing tendency, on the part of nerve force, to take and keep certain very definite paths, and only a slight overflow reaches centres other than those involved in the volition.

Remnants of this difficulty are seen in our individual incapacity to move voluntarily certain muscles without unwilled action on the part of others.

Illustrations abound in disease, as Hughlings-Jackson and Buzzard have shown when certain centres become over-excitable, and their re-

lated muscles move in irregular response to so much nerve force as overflows upon them from acts of will or from involuntary acts, meant to evoke only specific results. Here that which usually only throws on the centres mere tone waves, becomes, through their acquired excitability, competent to cause unwilled and irregular motion.

We are now in a position to understand that incessantly there are flowing variable amounts of nerve force upon and through the centres to the muscles. A blow on one of them reveals the amount of this addition to their power to respond by motion. It is well seen in the fact that a partly exhausted hand can act better on the dynamometer when its fellow is willed to consentaneous action.

A single violent act tunes, so to speak, every other muscle in the body through the overflow it sets in movement. The first blow a man strikes thus makes him more competent to strike the next, and a hurt of any kind adds directly to this readiness for action.

A beautiful illustration of overflow lies in the ease with which a torpid bladder empties itself during or just after the chilling shock of a cold bath, and helps also to explain many results of cold affusion commonly accepted as reflex

It is probable that in certain states of enfeeblement the tone waves grow less and that in this way we may account for the difficulty of active motion which these conditions exhibit. We have ourselves observed that on dull, damp, warm days the response to knee-taps was in some men distinctly lessened, and also that reinforcements did not give us the usual ample gain in motion nor give rise to exceptionally violent responses, common at other times.

We have then tendon-jerk, its increase, its loss, and its reinforcements by distant muscle and sensation acts. We have also muscle-jerk, its increase, its loss, and reinforcements, and other peculiarities. Having acquired new knowledge as to these latter facts, we wish to apply them to disease. To do this, so as best to see relations at a glance, we have made the first extensive effort known to us to represent symptoms and their force by signs. We thus express in one table with the eloquence of condensation what we venture to call the equation of each case, and also make easy the recognition of any one symptom over a set of cases. Table I. shows the varying symptoms in twenty-three cases of locomotor ataxia, expressed in signs which may easily be interpreted by referring to the explanation at the foot of Table II.; many of these signs, however, need no elucidation. Where two signs occur in the same space, and where R (right) and L (left) are not mentioned, the first refers to the right and the second to the left side; or the first refers to the hands and the second to the feet, as may be seen by the context. Table II. is taken from Table I., and is a distinct effort to class the cases by some decisive symptom. For this we select station, the relative power to stand steady, with eyes

TABLE I.

No. of case	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Sex	M.	M.	M.	M.	M.	M.	M.	M.	M.	M.	M.	M.	M.	M.	M.	M.	M.	M.	M.	M.	M.	M.	F.
Age	49	42	56	49	44	47	56	52	52	46	37	44	44	40	60	52	47	38	51	51	58	29	
Duration of disease in years	4	3	7	...	7	6	4	..	18	7	4	9	5	14	23/4	8	5	4	9	10	6	22	
History of syphilis	P	P	P	...	O	P	P	O	O	P	P	P	P	O	P	P	O	P	P	O	O	O	?
PRESENT CONDITION:																							
Gait	A	N	A	...	A	A	A	A	A	A	N	N	A	O	A	N	A	N	O	O	O	O	O
Pain	+	P	+	...	+	O	P	—	P	++	+	O	+	+	—	—	++	+	+	+	—	+	+
Gastric crises	P	O	P	...	P	O	O	O	P	P	O	O	O	O	O	O	+	O	O	O	O	O	
Sense of touch in hands, in feet	—	N	N	...	—	N	N	—	N	—	N	N	=	=	=	N	=	N	N	N	=	=	
Power of localization in hands, in feet	—	N	—N	...	—	N	N	N	N	N	N	N	—	O	—	N	—	N	N	N	N	N	0
Temperature sense	N	N	...	...	N	N	N	...	...	...	N	...	N	O	N	N	O	N	N	N	...	...	
Hearing	N	N	N	...	N	—	N	=	=	—	N	N	=	O	—	—	O	N	N	=	O	O	
Station (ability to stand steadily)	=	N	—	...	=	—	=	=	=	—	N	O	=	O	O	P	O	P	O	P	O	O	
Vertigo	O	O	P	...	O	—	O	O	P	O	N	O	L—	O	O	N	+	N	...	N	O	O	
Vision (not carefully tested)	N	H	—	...	N	—	—	O	—	N	O	O	RO	O	O	O	O	P	...	P	O	O	
Diplopia	P	O	+	O	O	—	+	O	P	P	N	N	...	...	O	N	+	N	...	N	...	...	
Condition of pupils	N	N	?	?	N	O	±	△	±	±	O	O	△	±	±	±	△	△	±	±	△	△	
Pupillary reflex to light	O	S	S	O	—	N	RNLS	N	O	RSLN	—	—	≈	O	O	O	O	—	O	N	...	...	
Pupillary reflex to accommodation	+	S	S	—	N	S	+	O	—	NS	—	—	+	O	S	S	O	N	N	...	...	...	
Sexual functions	...	N	N	...	—	—	—	N	—	O	—	—	—	O	O	N	...	N	N	...	N	N	
Bladder	I	N	I	...	S	S	I	C	S	S	S	C	S	I	N	N	I	N	N	I	N	I	I
Bowels	N	N	C	...	N	N	I	N	C	O	C	C	—	N	O	N	C	N	N	C	N	C	O
Ankle- and knee-jerks, right and left	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	O
Reinforcement of same by voluntary motion elsewhere	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	O
By pain and other sensory impressions	OO	...	OO	...	OO	...	OO	OO	...	OO	..	OO	OO	OO	OO	...	...	OO	OO	OO	OO	OO	O
By faradism with the wire brush	OO	OO	OO	...	...	...	OO	OO	...	OO	OO	OO	OO	OO	OO	OO	...	OO	...	OO	OO	OO	O
Elbow-jerks, right and left	O	R—LO	O	?	O	—	O	O	O	—	N	O	O	O	O	++	O	O	+	O	O	O	
Reinforcement of same	O	—O	ROL—	?	O	+	O	...	O	—	N	O	P	O	O	+	O	O	+	O	O	O	
Chin-jerk	P	P	P	+	O	O	P	+	O	+	O	N	P	O	O	+	O	O	+	O	O	O	
Muscle-jerks in legs	—	N	—	+	O	+	—	O	N	O	N	N	O	O	+	O	O	O	+	O	O	O	
Reinforcement of same	O	O	...	+	O	+	O	N	O	+	N	N	N	O	O	+	O	O	+	O	O	O	
Muscle-jerks in arms	N	N	N	+	O	+	N	O	—	O	N	N	O	O	—	N	O	O	+	O	O	O	
Reinforcement of same	O	N	O	...	O	+	O	N	O	O	N	N	O	O	N	N	O	O	+	O	O	O	
Skin reflexes, plantar	O	N	...	+	O	O	—	O	O	O	N	N	O	O	O	N	O	O	+	O	O	O	
Cremaster	O	—	—	+	N	O	O	N	O	O	N	N	O	O	O	N	O	N	O	O	O	O	
Abdominal	L—	N	—	+	N	O	—	N	O	O	N	N	O	O	O	N	O	N	O	O	O	O	
Epigastric	O	N	N	+	N	O	+	N	O	O	N	N	O	O	O	N	O	N	O	O	O	O	
Associated movements	...	...	...	...	...	+	...	...	...	...	O	O	...	+	...	...	...	...	...	...	...	...	
Mounding of muscles when struck	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Tremor of muscles after blow	...	P	...	O	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Reinforcement of same	...	P	...	...	...	...	+	...	—	...	O	O	...	O	...	...	...	...	...	...	...	...	+
Prominence of eyes	+	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

TABLE II.—A PARTIAL STUDY OF TWENTY-THREE CASES OF LOCOMOTOR ATAXIA.

	Class I. Station normal.		Class II. Station slightly impaired.							Class III. Station greatly impaired.						Class IV. Paralytic stage.						
No. of case	2	11	3	6	10	12	15	16	18	1	5	7	8	9	13	14	17	19	20	21	22	23
Ankle- and knee-jerks	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Reinforcement	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Elbow-jerks	R—LO	N	O	—	—	O	O	R+L+	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Reinforcement	R—LO	N	ROL—	+	—	O	O	R—L+	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Muscle-jerks in legs	N	N	—	+	N	N	±	+	+	—	O	—	+	N	+	—	+	+	—	+	+	O
Reinforcement	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Muscle-jerks in arms	N	N	N	+	+	N	—	+	+	N	—	N	N	—	N	+	+	+	+	+	+	O
Reinforcement	N	N	O	+	O	R—LO	O	N	O	O	O	O	O	O	P	+	O	O	+	O	O	
Chin-jerk	P	O	P	O	+	P	O	+	O	—	O	P	...	...	P	O	O	O	+	+	O	
Associated movements	.....	O	...	+	O	O	O	O	...	...	...	+	+	O	+	+	—	—	—	+	++	
Mounding	.....	O	...	+	+	O	O	O	+	...	+	...	...	—	+	O	+	O	+	+	O	
Prominence of eyes	+	O	O	O	O	O	O	O	O	+	...	+	O	—	O	O	O	+	O	O	O	+
Hearing	N	N	N	—	—	N	—	—	N	N	N	N	—	—	N	—	O	=	=	—	N	—
Vision (not carefully tested)	H	N	—	—	N	N	N	N	N	N	N	—	N	—	ROL—	O	—	...	N	O	N	—
Age of patient	42	37	57	47	46	44	60	52	38	49	44	56	52	52	44	40	47	51	51	58	29	52
Age of disease	3	4	7	6	7	9	2½	8	4	4	7	4	?	18	5	14	5	9	10	6	22	10
Average age of disease	3.5 years.		6.2 years.							7.6 years.						10.8 years						

EXPLANATION OF SIGNS USED IN THE TABLES.

M = male.
F = female.
N = normal.
O = absent.
— = slight, or diminished power or response.
= = very slight, or greatly diminished power or response.
\+ = marked, or increased power or response.
++ = very marked, or much increased power or response.
± = irregular, or irregular distribution.
∞ = natural order of affairs reversed.
I = incontinence.
R = right.
L = left.
A = ataxic.
S = sluggish.
P = present.
H = hypermetropic.
△ = small pupils.
□ = large pupils.

open or shut. This symptom can be made numerically accurate by standing the patient in front of a bar marked in inches, and placed on a level with the ears. The extent of lateral sway of the head may thus be easily observed; a like observation records the anterior tendency. The first is rarely over half an inch in health; the second does not usually exceed an inch, even with closed eyes. Any large increase is suspicious. The observer should be seated, in order to eliminate his own sway, and should be at a set distance from the patient. Dividing our ataxics by this test into classes we have, as a starting-point, Class 1, normal station; then Class 2, slight impairment; Class 3, great impairment; and Class 4, the paralytic stage. The division as between Classes 2 and 3 is difficult, but the check of the average duration of disease shows our classifications to have been reasonable. Now let us group the muscle phenomena in relation with the integrity and the lack of station.

We have long been looking for the tests of a preataxic stage in posterior sclerosis, which stage might be amenable to treatment; but usually the nearest approach we can make is to find pains, or strabismus, and with these, loss of knee-jerk. A glance at the double row of zeros, in the lines ankle- and knee-jerks, and reinforcement, shows that all of our cases, at least, have reached this stage, and give no information of use so far as the legs are concerned. If we turn to the arm symptoms, we are in a more fertile field. We should have reflected long ago that as ataxy of the arms comes on even years after the legs have gone through their stages of failure, we might expect, with watchfulness, to trace in the arms of recent cases preataxic alterations and the fatal progress of the arm muscles in the direction of impaired tone. But even the newest of our own cases have gone too far to yield all we wish to know or hope yet to see. We note that the arms seem to advance through the same changes as the legs. The biceps-jerk (elbow-jerk) and its reinforcement are found only in Classes 1 and 2; with a much impaired station or station loss (Classes 3 and 4) they are gone. In one case in Class 2, the elbow-jerk, though absent, is seen on reinforcement. Had we a much larger number of cases we should probably observe more instances of lost elbow-jerk with reinforcement yet possible, in various degrees.

In one instance the elbow-jerk and reinforcement are in excess, and this, with some like facts, makes us query as to the possibility of their being a representation of a preataxic stage of excitability. Several cases recently studied by us present some of the earlier symptoms of posterior sclerosis, and yet show an increase of the knee-jerk with an increased reinforcement. May not this represent an irritative condition of the cord which will subsequently fade and give place to more decisive and distinctive local trouble in the posterior columns?

Bramwell[1] believes that an exaggeration of the reflexes may result from increased excitability of the gray matter. In such cases it is but too likely that a diagnosis of disease of the lateral columns would be accepted as the sole explanation.

The very interesting investigations of Norris[2] tend to corroborate this view of the case. He discovered an increase of the knee-jerk in eighteen out of thirty-seven cases, which also exhibited varying degrees of degeneration of the optic nerves and were, presumably, early ataxics. Later examination showed, in some of these, a diminution or absence of the knee-jerk.

In Classes 3 and 4 the elbow-jerk is lost, just as the knee-jerk was long before. The forearm muscle-jerks and their reinforcement are interesting—both normal in Class 1. As the cases advance, the muscle-jerks show irregularities, and are not lost utterly in a single case, up to the paralytic stage, while reinforcement of them is not possible in some of Class 2, and in Classes 3 and 4 is absent.

TABLE III.—A STUDY OF THE MECHANICAL REACTIONS OF TENDON- AND MUSCLE-JERKS IN LOCOMOTOR ATAXIA.

	1st stage.	2d stage.	3d stage.	4th stage.	5th stage.	6th stage.
Tendon-jerk . . .	Diminished or absent.	Absent	Absent	Absent	Absent	Absent
Reinforcement . . .	Fair	Absent	Absent	Absent	Absent	Absent
Muscle-jerk . . .	Normal	Normal	Normal	Increased, regularly or irregularly distributed.	Diminished and irregularly distributed.	Absent
Reinforcement . . .	Normal	Normal	Absent	Absent	Absent	Absent

NOTE.—A *pronounced tendon-jerk capable of excessive reinforcement* is sometimes seen in the earliest stages of locomotor ataxia. *Mounding of the muscle at the point struck* sometimes occurs in stages 4 and 5, and occasionally even in 3.

From these data Table III. is made up. It represents the mechanical reaction changes in the muscle- and tendon-jerks of the arms, and theoretically in those of the legs. They may be seen to alter in this order. The tendon-jerk is lessened or lost, but can still be reinforced in the first stage. In all successive stages both are absent. Meanwhile the muscle-jerk, say of the extensors of the hand, is healthy in stages 1 and 2, and reinforcible in both. In stage 3 the muscle-jerk is normal, but there is no reinforcement. In stage 4, with station much impaired, the muscle-jerk becomes increased. It is quicker and larger, as Buzzard observed in 1878, and Erb also, but now it is irregularly distributed, and may be less in places, and cannot be reinforced. In stage 5 the muscle-jerk

[1] Diseases of the Spinal Cord, by Byrom Bramwell, M.D., F.R.C.P. Edinburgh, 1882, p. 112.

[2] On "The Association of Gray Degeneration of the Optic Nerves with Abnormal Patellar-tendon Reflexes," by Wm. F. Norris, M.D., 1885. Transactions of the American Ophthalmological Society.

is lessened irregularly, and no reinforcement is possible. In stage 6, that of complete paralysis, rarely attained because death is apt to intervene, all the reactions, tendinous and muscular, and all reinforcements vanish. Of the chin-jerk, little can be said. It is sometimes absent in health, or is hard to get, and seems more common in stages 1 and 2 than in 3 and 4.

The various changes here mentioned probably represent incompletely, the totality of alterations of muscles in posterior sclerosis. The gradual cutting off of spinal tone waves is shown in the successive loss of tendon-jerk and its reinforcement, and of muscle reinforcement. The increase of direct muscle-jerk which ensues may be due to some irritative changes in the muscle, not as yet to be fully understood. It is followed by lessening of muscle-jerk, and at last by paralytic loss of all muscle reactions. Some microscopic studies of muscle tissues are still needed to explain these late phenomena.

While studying the effects of voluntary motion on the tendon- and muscle-jerks it was noticed that associated movements occurred in many of the cases. Thus, on clenching the fist, movements occurred in the other hand, or even in one or other of the legs. This we discovered too late to note it in all our cases. It apparently belongs to an advanced condition of the disease. To observe it, the hand should rest in passive supination on the thigh, while the opposite fist is being clenched; the patient's attention should not be called to the possible result of the experiment.

In Class 4 it was seen in six out of seven cases, and not looked for in one. In Class 3 it was present in three out of the six cases, absent in one, and not looked for in two.

In Classes 1 and 2 it was seen twice, absent five times, not sought for in two patients—a percentage of 64.75, exclusive of five cases where the symptom was not looked for. Muscle-mounding was found irregularly, without positive relation to the state of the disease.

A new symptom, distinct prominence of the eyes, with a full appearance of the surrounding tissues not due to œdema, was found six times, chiefly in late cases. Hearing was lessened in 44.4 per cent. of the cases in Classes 1 and 2; in 66.6 per cent. in Classes 2 and 3; and was normal in but one of Class 4. Vision was not tested with care.

INSANITY AND CRIME.

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Under this heading, an article from the pen of Lord Bramwell appeared in the December number of *The Nineteenth Century*.

Any utterance of so distinguished a judge, such an eminent legal authority, demands careful consideration and respectful attention.

The authority of his name, and the dogmatic form of his propositions, give such weight to what he writes that many will accept his statements as conclusive.

However presumptuous it may appear, it is this fact which makes it all the more incumbent on a member of the medical profession to record a protest against the doctrines enunciated and the conclusions arrived at by his lordship.

I concur with him in deprecating a quarrel between doctors and lawyers. Lawyers are bound to administer the law as it exists, whether it be good or bad; but doctors have a right—a right common to all citizens—to protest against, and endeavor to have amended, a law which they believe to be both unjust and cruel, and which they know fails to carry out the object it has in view.

The law as laid down by him is evidently taken from the answers of the fifteen judges to the House of Lords; it is restricted by him to its very narrowest interpretation—the knowledge of right and wrong.

It is fair to interpret Lord Bramwell by Lord Bramwell—so as clearly to understand what he means by "that he did not know that the thing he did was wrong." In the case of Thomas Humphreys, tried before him at Stafford, he defined doing wrong as "what the law forbade," ignorance of the nature and quality of the act, as "did not know he was inflicting hurt," or "that his act was injurious to the person he attacked."

The law so limited he thinks right to demonstration. Sir James Stephen, an authority of at least equal weight, differs from him. He considers that the answers of the judges

> "leave untouched the most difficult questions connected with the subject, and lay down propositions liable to be misunderstood, though they might, and I think ought to be construed in a way which would dispose satisfactorily of all cases whatever."

He considers that the points on which the law appears to be left in doubt may be reduced to one question:

> "Is madness to be regarded solely as a case of innocent ignorance or mistake" (Lord Bramwell's view), "or is it also to be regarded as a disease which may affect the emotions and the will in such a manner that the sufferer ought not to be punished for the acts which it causes him to do?"
>
> "I am of opinion that even if the answers given by the judges in Mac-

Naughten's case are regarded as binding declarations of the law of England, that law as it stands is, that a man who by reason of mental disease is prevented from controlling his own conduct is not responsible for what he does."

Again,

"If the narrower interpretation of the answers given by the judges is the true one, and if these answers are regarded as a complete and binding authority, madness must be regarded as merely a possible cause of innocent mistakes as to matter of fact and matters of common knowledge."[1]

An American judge thus speaks of the doctrine as to insanity contained in the answers of the judges:

"The doctrine thus promulgated as law has found its way into text-books, and has doubtless been largely received as the enunciation of a sound legal principle since that day. Yet it is probable that no ingenuous student of the law ever read it for the first time without being shocked by its exquisite inhumanity."

"It practically holds a man, confessed to be insane, accountable for the exercise of the same reason, judgment, and controlling mental power, that is required in perfect mental health. It is in effect saying to the jury, the prisoner was mad when he committed the act, but he did not use sufficient reason in his madness. He killed a man because under an insane delusion he falsely believed the man had done him a great wrong, which was giving rein to a motive of revenge, and the act is murder. If he had killed a man only because under an insane delusion he falsely believed the man would kill him if he did not do so, that would be giving rein to an instinct of self-preservation, and would not be crime."

"It is true in words the judges attempt to guard against a consequence so shocking as that a man may be punished for an act which is purely the offspring and product of insanity, by introducing the qualifying phrase 'and is not in other respects insane.' That is, if insanity produces the false belief which is the prime cause of the act, but goes no further, then the accused is to be judged according to the character of the motives which are presumed to spring up out of that part of the mind which has not been reached or affected by the delusion or the disease."

"To say that an act which grows solely out of an insane belief that some great wrong has been inflicted, is at the same time produced by a spirit of revenge springing from some portion or corner of the mind that has not been reached by the disease, is laying down a pathological and psychological fact which no human intelligence can ever know to be true, and which if it were true, would not be law, but pure matter of fact."[2]

Lord Bramwell states the law is right to demonstration for the reasons he has given. The reasons he has given are:

"The law ought to punish all whom it threatens on conviction."

"It ought to threaten all who would be influenced by the threat, all whom it would or might deter or help to deter."

"Therefore the question should be, not whether a person accused of crime is mad, but did he understand the threat; if he did not, the threat would be unintelligible to him, and would not deter."

This assumes that if an insane person understands that the law punishes a certain act, he will be deterred from doing it, or influenced by the threat; and to this assumption a unanimous denial is given by all those who have studied insanity, and have experience of the insane.

[1] Stephen, History of Criminal Law, vol. ii. 1883 [2] Ladd, State v. Jones.

His propositions seem also to imply that the one object of the criminal law is to deter, from fear of punishment alone, people from doing certain acts.

From this view Sir J. Stephen dissents,

"being of opinion that if in all cases criminal law were regarded only as a direct appeal to the fears of persons likely to commit crimes, it would be deprived of a large part of its efficiency."

He does "not think it admits of a doubt that law and morals powerfully support and greatly intensify each other in this matter;" and that "whatever effect the administration of criminal justice has in preventing the commission of crimes is due as much to this circumstance as to any definite fear entertained by the offenders of undergoing specific punishment."[1]

To the fear of punishment must, therefore, be added the infamy which attaches to a criminal conviction, and this is entirely incomprehensible to a multitude of the insane who are perfectly capable of understanding that a given action is forbidden by the law.

But surely the object of punishment is more than to carry out a threat, or to deter certain persons from specific acts. While on the one hand, it seeks to protect society by preventing crime through fear of infamy, on the other, it strives to effect its purpose by incapacitating the criminal, so that when he is incarcerated it endeavors to reform him.

An insane person is, no doubt, prevented from committing criminal acts by being executed or imprisoned; but is he likely to be reformed by imprisonment—that is, cured? Most certainly not, quite the contrary; on this point I can speak with the authority of my experience as a prison surgeon. So one object of punishment does not apply to him as it does to the sane.

To make Lord Bramwell's propositions logical, they ought to be expressed somewhat as follows:

The law ought to punish all whom it threatens on conviction.

It ought to threaten all who would be influenced by the threat, all whom it would or might deter or help to deter.

All madmen who understand the law's threat are influenced by the threat—are or might be deterred or helped to be deterred by it.

Therefore, all madmen who understand the law's threat ought to be punished.

Now I deny that all madmen who understand the threat are influenced, etc., or deterred by it.

Lord Bramwell admits this, for he says it does not always deter; therefore, from his own propositions, it would follow that some madmen who do understand the law's threats ought not to be punished.

To escape from this dilemma, he argues that the same is true of men in their perfect senses, and, if that were a reason for not punishing the insane, it would equally be a reason for not punishing the sane. This I

[1] Stephen, op. cit.

deny. In the first place, no comparison lies between the sane and the insane; and, in the second, there is an incorrect assumption.

It is assumed that the threat of punishment is equally effective in deterring the insane and the sane. This is contrary to fact. While it may be true to say that it would be inaccurate to assert that it *never* deters, it is perfectly correct to say it *seldom* deters, and then only in those cases in which the mental disease is so slight that not only is there intellect enough to comprehend, not as an abstract idea, but as a real practical fact, both the law's threat and the infamy attaching to crime, but also sufficient will or self-control left to govern action.

If the threat of punishment does not deter the insane, and I say it does not or cannot in anything like the same proportion that it does the sane, then the entire structure, built on those whom the law ought to punish, and those whom it ought to threaten, falls to the ground.

Admitting that it does not always deter, Lord Bramwell gives as a reason that "it does not deter as often as it ought because madmen are cunning enough to know that from the way the law is administered (owing to the unwise mercy of judges and juries) they can commit crimes with less chance of imprisonment than sane people can." To any one who has studied insanity, who has experience of lunatics, this statement appears so astounding, so entirely contrary to fact, that it is difficult to believe that it is seriously put forward. With rare exceptions, madmen do not know they are insane. They are indignant, and feel outraged if their perfect sanity is questioned, and will endeavor, to their utmost, to prove they are sane.

To the insane man, his delusions are a reality, he has no doubt of their existence, all the argument and proof which could be put before him will not convince him to the contrary; the voices he hears are real voices, the figures he sees are real figures, the torments he suffers are real torments; his ideas are the only correct ones, if they differ from those of other people so much the worse for the others, he is actually the person, or divinity, or demon he believes himself to be, of that he has no doubt. He may have wit enough and strength enough to conceal his delusion when it suits his purpose, and to prove that he is sane; but he never puts it forward, or admits it is a delusion to prove his insanity—one of the most marked features distinguishing real from feigned insanity is that whereas the lunatic believes that he is, and tries to prove himself sane, the malingerer endeavors to prove that he is mad.

In a lucid interval a lunatic may remember what he did and deeply deplore his act; nay, more, he may admit that he was mad when he did it; but that does not show that, when mad, he knew he was so. He may also recognize the symptoms of an approaching paroxysm, and beg to be taken care of.

An insane person in an asylum may know that a madman has a chance

of escaping the legal consequences of a criminal act. Thus, when Martin set fire to York Minster, the inmates of an asylum discussed the probabilities of punishment, and one of them exclaimed, "They cannot hang him, because he is mad; he is one of ourselves."

It is important, however, to understand that this consciousness of their state belongs only to madmen surrounded by madmen in lunatic asylums, or to those who have been under treatment, and that even to those so circumstanced it is not general.

It is no proof to the contrary that in asylums the inmates are, to *some extent*, deterred from doing wrong, or stimulated to do right, or rather to exercise some self-control, from the fear of losing some indulgence, or of closer restraint. These motives can be only acted on very cautiously, for, if overstrained, the patient is injured, and all control over him is lost.

But the power which can control is, in an asylum, brought clearly and comprehensively home to him. It is tangibly present in the forms of the attendants; it is so simple, so immediate, so visible, that he can grasp the fact, not of punishment perhaps, but of a power which, rightly or wrongly, justly or unjustly, can and will prevent unruly action.

Outside the asylum he sees no such power. He may have an abstract notion of the law's punishment; but it is a vague, unreal knowledge, that has no practical or controlling effect on his thoughts and actions.

If the argument had been: If we admit that the law's threats do not deter the insane, and therefore they should not be punished, sane criminals will feign insanity so as to escape the consequences of their acts, it would have been correct; but that would be no reason to punish madmen.

Admitting they have not the same control over their actions that sane people have, Lord Bramwell denies that they cannot help their actions, and says they are restrained and kept in order in the same way sane people are, though with more difficulty.

If he means when at large in the world, I absolutely deny it; it is absolutely contrary to the experience of all who have a knowledge of the insane. It presumes that a madman reasons like a sane one, and that, judging how a sane man will act, will enable us to predict how an insane man will act if we knew his delusions or thoughts. Locke's aphorism that a madman reasons aright from wrong premises is far from being universally true.

If he means when in asylums, then it is only partially true. That lunatics in confinement are kept in order with infinitely more difficulty than sane prisoners, is true; but that they are or could be by the same discipline and methods, is not correct. If we know what a sane prisoner thinks, we can pretty accurately tell what he will do; but it is totally different with the insane. Knowing what they think, or knowing their

delusions, will not tell us what they will do, or what will be the outcome of the delusion in action. Sir J. Stephen defines compulsion (mental) as choosing the less of two evils. A madman, driven to commit homicide by a delusion that he was obeying a divine command, which, if he disobeyed, would consign him to eternal torment, could not control his action, although he might be well aware, not only of the legal penalty, but have an intense horror of the act, and deeply deplore the terrible necessity which compelled him to do it.

That in some cases insane persons do resist a criminal impulse is no proof that all can—moreover, experience shows that the power of resistance in such cases is often lost after a time, in others, it is evidence of recovering sanity; but in a given case to decide whether an act was controllable or uncontrollable—that is, how much was due to sanity and how much to insanity—is to tax human intellect beyond what it is able to bear

Having admitted that from their unhappy mental state the insane have less control over their actions than the sane, Lord Bramwell allows that the argument used by him goes the length of severer punishment for insane people—that is, it presumes that it is a case of unwillingness not of inability to control their actions; indeed, this is made clear by the illustration given.

In fact, he makes madness to mean badness. If a man, from mental disease, has not the same control over his actions as a sane man, I fail to see how the law, by threatening to punish him, can place him on the same level with the sane.

It is not a case of will not but cannot, of physical disability, of loss of power—no amount of punishment can make a man with a paralyzed arm use it, or stop the facial contortions or muscular jerkings of chorea, or the convulsions of epilepsy,—and no amount of punishment or magnitude of threat can restore to the insane the control over their actions of which they have been deprived by their unhappy mental state. This is a matter of fact and not of law—no law can make or cure a disease, nor can any law create or restore a power removed, perverted, or weakened by disease.

The law, as defined by Lord Bramwell, is, I say, illogical, cruel, and unjust—it is repulsive to common sense, it is out of harmony with the moral sense; and hence, juries, in opposition to the direction of judges, return verdicts of not guilty on the grounds of insanity.

It exempts from punishment those insane people alone who do not know they are doing wrong—that is what the law forbids.

Now a delusion that some one is about to kill him is no stronger evidence of disease, than a delusion that some one is about to injure him, or than any other delusion, nor in the one case does the insane man think, or is he more capable of thinking, whether his action is legal or illegal.

Both are equally mad, equally incapable of calm thought, or of judgment as to right and wrong.

A delusion being a symptom of a disease it is irrational to exempt from punishment the case in which the connection between the symptom and the action is apparent, and to include the one in which it is not. The disease is the same, the effect on the mind identical. Moreover, the action may be the direct consequence of the delusion, although the sane mind is unable to follow the process of thought which led up to it; "there is an incoherence between their ideas, and there is an incoherence between their ideas and actions."

The example given in the article illustrates this, "Stealing, with proof that the offender believes he is the King of England. He goes to a shop, has goods shown him and secretes some, or picks a pocket; he has a delusion unconnected with his crime." But is the delusion unconnected with his crime? With the insane delusion of grandeur would probably be the insane enlargement of the prerogative, the right to take a subject's property—he has learned from experience that his title is not acknowledged generally, and concludes that the shopkeeper will not admit it either, and will prevent his taking what he wants—therefore, he secretes it—or he knows that subjects have often rebelled against the exercise of the prerogative when it affected their property or purses—but, at the same time, he is perfectly satisfied he is acting within his legitimate rights.

Delusions do not destroy but pervert the mental faculties, and it is impossible to say, although a delusion is apparently unconnected with a crime, that it has not been a compelling cause of its commission.

Thus in the case of the madman, quoted by Lord Bramwell, who had a craze about windmills, and who, on being removed to a part of the country where there was none, first set fire to the house in which he was placed, and on another occasion enticed a child into a wood, and, in attempting to murder it, cut and mangled its limbs in a horrible manner, there was no apparent connection between his craze about windmills and either or both the crimes, yet it was the direct cause, for he perpetrated them in order that, as a punishment, he might be sent to some place where he could spend all his time watching windmills. For this man Lord Bramwell has no pity, and thinks him as hateful as any sane criminal could be. Yet Sir J. Stephen thinks "it would be open to a jury to draw the conclusion that he was incapacitated from forming a calm estimate of the moral character of his act—in other words, he had not the capacity of knowing that it was wrong."[1]

Another example given is that of a man who, from some religious craze, wanted to be executed, and who, to bring it about, committed murder. This, Lord Bramwell considers a case of utter selfishness and

[1] Stephen, op. cit.

cruelty; and neither his conscience nor his pity would be moved in favor of the wretched creature—that is, he says the man was bad, but not mad. But it is difficult to conceive a sane man committing murder with a view of being hanged; and, taking merely the deterrent view of the law's punishment, it evidently could have no effect on such a one. Therefore "it would be wrong to punish him, because it would be useless to threaten him."[1]

To the argument that the law is hard or unjust to the insane, it is no answer to say it might be used by others than the lunatic. Whether the law is hard or unjust to others, is beside the question. If others are oppressed by it (I do not say they are), that is no reason why the lunatic should be; doubling the evil will not lessen it. Where the offender is insane, his act is the product of disease, or so mixed up with it that it is impossible to say how much is caused by disease, and how much is not.

This case is so like Hadfield's that the words of Sir J. Stephen with reference to it apply aptly:

> "The propositions that the effect of disease upon the emotions and will can never, under any circumstances, affect the criminality of the acts of persons so afflicted, is so surprising, and would, if strictly enforced, have such monstrous consequences, that something more than an implied assertion of it seems necessary before it is admitted to be part of the law of England."[2]

In dealing with what are called monomanias, Lord Bramwell has been neither successful nor scientific. He asserts that a great number of madnesses have been invented in modern times; defines a monomaniac as "the man being sane, except having a strong passion for drink and so on;" declares such persons are not suffering from disease of the mind at all; only wrong in their passions, appetites, or propensities. He bases his belief on a dictionary definition of mania, and argues, therefore, that kleptomania cannot exist, because it is consistent with the greatest calmness and cunning; homicidal mania, because the steps can be taken with no appearance of delirium or want of calmness; dipsomania, because men afflicted with it have had mental capacity of the highest order—all of which shows a startling ignorance of the subject he is writing on.

I am not aware that Lord Bramwell has studied physiology and pathology; that he has ever spent any portion of his time in an asylum, watching the habits of the insane, studying their method of thought, unravelling the tangled maze of their ideas, and from day to day observing and recording facts and cases. If he had, then, indeed, his opinions as to what is or what is not madness would be valuable, and probably correct.

The law, indeed, declares that partial insanity exists, the man being

[1] Lord Bramwell, Nineteenth Century. [2] Stephen, op. cit.

sane in other respects. To question 1 of the House of Lords, the judges reply: "Assuming that your lordships' inquiries are confined to those persons who labor under such partial delusion only, and are not in other respects insane."

But such madness does not and never did exist. The mistake has arisen from magnifying a symptom into a disease. The disease is madness, or unsoundness of mind. But a delusion or idea may dominate the mind, may be the principal, and to the superficial observer the only symptom, and because its effect and control over the rest of the mind are not apparent, the man is said to be sane in other respects. Whether he is so or not is a matter of fact; if he is not, then the law cannot make him so, and those whose special study and life-long observation of the insane give them the right to speak authoritatively declare in no uncertain terms that he is not.

"The difficulty which exists has arisen from the occasional treatment by experts of these floating symptoms of one disease as if they were independent diseases. There is but one mind to each of us, though the mind has many functions. There can be but one disease to which psychologically the term insanity may be applied, though this disease manifests itself even in one and the same patient in various ways."

"The mind of man is not like a ship constructed with water-tight compartments, one or more of which may be injured or waterlogged, leaving the rest sound and unaffected. If one of the so-called mental faculties is affected, all suffer with it, all are more or less influenced or controlled by it."[1]

Monomania is merely a subdivision (for convenience of study or description) of madness.

The existence of the various so-called monomanias are facts proved to demonstration. That with madness of the more dangerous type there often exist great intellectual power, absence of delirium, and perfect calmness, is also a fact proved to demonstration—a delusion which dominates the entire mind may be so skilfully concealed that it escapes observation for a long time; as, for example, the well-known case in which Erskin totally failed to elicit from a lunatic the slightest indication of his insanity, until after a long course of cross-examination he was told by some one in court what the delusion was; or that of the man in the Bicêtre, who baffled the commissioners sent to examine him, and only betrayed his delusion by signing his discharge as Jesus Christ. It is impossible for the sane mind to follow the workings of the insane, for action which apparently has no connection with the delusion may be its insanely logical conclusion. Madness does not in all cases destroy the mind—it perverts it. Thus the madman with the delusion that God has commanded him to kill himself or some other person, will go about what he believes to be his duty with calmness and determination, without apparent delirium or excitement, will show reason, judgment, fore-

[1] Francis Wharton, Wharton and Stillé, 1882

sight, and self-control, while all the time he is compelled by insanity to take his own mother's life.

What are passions, appetites, and propensities? Where do they exist? Why there is not one of them which may not be, and often is, excited to ungovernable activity, or altogether abolished by disease of the brain.

Metaphysical distinctions, drawn from the inner consciousness of sane men, are not in harmony with either the pathology of insanity or the physiology of the brain.

The moral faculty is something apart from, and as it were outside of the intellect, according to metaphysicians. Yet it is not so. Knowledge of right and wrong is as much an intellectual acquirement as a knowledge of the rivers and mountains of Europe, or the problems of Euclid.

What is called moral insanity is nothing more than disease or defective development, exhibiting itself in either incapacity or disturbance of the knowledge, or power to control the actions which are considered morally right or wrong.

There is not sufficient information given to say whether the man mentioned was sane or insane; but on hearing that a married man, of excellent character, committed thirty or forty crimes of the nature indicated with the greatest violence and cruelty, I should, were I examining him, look not only for hereditary taint, but for symptoms of that most insidious and fatal disease—general paralysis of the insane.

It is a well-known fact that insanity and general paralysis of the insane often seem to commence with immoral acts. The man of hitherto blameless life, of religious principles, or of unimpeachable integrity, of unstained moral character, becomes a thief, a liar, a drunkard, or gross sensualist. The inequality of the pupils, the slight tremulousness about the mouth, the hesitation in speaking, the tremor of the tongue, other *little* symptoms, are not noticed, or ignored. The man's fall from virtue is deplored, and the idea that his changed conduct is the outcome of fell disease is treated with contempt.

What should be done with such persons, Lord Bramwell asks. He is not averse to hanging, only doubts whether flogging would not be better—more deterrent. Unfortunately for him, it has been tried and found a failure. Madmen have been flogged, put in the pillory, enclosed in cages, chained like wild beasts, yet, strange to say, it did not prevent other men becoming insane, nor insane men from committing crimes. All punishments that have been tried have proved failures, and must always fail.

As the law cannot create or limit a disease, so must its threats and punishments prove ineffectual either to abolish a disease or to control the actions resulting from it.

What is to be done then with madmen? Are they to be left at large to the danger and detriment of society? Certainly not. Send them to

their proper place—an asylum. If an insane man commits homicide, by all means confine him in an asylum for life; the protection of society demands this, not only to guard against a repetition of the act by the lunatic himself, but to prevent simulation of insanity by the sane. Imprisonment for life with lunatics would be to the sane far greater punishment than penal servitude—to many, worse even than death.

For less offences, confinement in an asylum till cured.

To punish a man for having a disease, or for the acts which his disease compels him to do, is unjust.

"Whatever the law may declare, I suppose it will not be doubted that a man whose power of controlling his conduct is destroyed by disease would not be regarded as morally blameable for his acts. If a man is punished by law for an act for which he is not blamed by morals, law is to that extent put out of harmony with morals, and legal punishment would not in such a case, as it always should, connote as far as may be possible, moral infamy."[1]

To remove a madman to a place where his disease will be properly treated, and where he cannot injure others, is just, politic, and humane.

Penal discipline is injurious to the insane; lunatics cannot be kept in prison; not only because it is detrimental to them, but because their presence is subversive of discipline, and a constant danger to the other prisoners and to the officers.

Whether a man is mad or not can be decided only by those who have experience of insanity—that is, by experts. If a man walked lame, Lord Bramwell could not help thinking him lame, although a Paget said he was not. Paget could tell whether he was really lame or shamming, Lord Bramwell could not.

In the case of a distinct, well-marked madness, lawyers and laymen can tell that the man appears mad. Whether he is so or not, or only shamming, can be decided only by those skilled in the habits and treatment of the insane—that is, by experts.

Madness is a disease far more subtle in its symptoms than other diseases, yet experts decide as to other diseases: why not as to madness? Yet by law they have to decide as to madness too, for an insane person cannot be taken into an asylum unless certified by medical men to be mad.

The law as it stands is a wrong law; it tries to define what is indefinable; to create a disease which does not exist; it withdraws from the jury matter of fact, and establishes tests which experience has shown to be utterly fallacious.

Finally, Lord Bramwell thinks it hard to say why lawyers generally supposed sharp enough should go wrong on this particular subject. The answer is simple: their education and training have not fitted them to deal with it. Versed in metaphysical lore and legal subtleties, they

[1] Stephen, op. cit.

have not studied physiology or pathology, nor acquired experience of the insane; just as no amount of book learning alone will enable a physician to deal with sickness, or a surgeon to operate, so no mere mental philosophy or legal training will enable a lawyer to grapple with the paradoxes of insanity. If lawyers were obliged to spend six months in an asylum studying mental diseases, they too would be quite as anxious as doctors are that the law should be changed, and would be just as convinced that it is wrong, as Lord Bramwell is that it is right. Nor would they fall into the error of considering madness not a disease of the body; for whether we look upon mind as the product of the brain or merely working through it, it is disease, functional or organic, of the organ, which is either its origin or instrument, that constitutes madness.

REFLEX AURAL SYMPTOMS WITHOUT AURAL DISEASE. AURAL DISEASE EXCITING REFLEX SYMPTOMS.

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In the *Annales des Maladies de l'Oreille du Larynx et des Organes Connexes*, September, 1884, an article appeared, entitled "Aural Symptoms occurring in Hysteria, and the Hysterical Element in Aural Disease." Two cases were reported: one of aural symptoms simulating inflammation of the mastoid, and caused by hysteria; the other, where slight hysterical symptoms were much increased by inflammation of the middle ear, with serous effusion. The report of these cases, which opens a wide field of research in the domain of hysteria, directs attention to another group of cases, occurring mostly in children, and which apparently is to be classed under the head of aural symptoms arising reflexly from trouble in other parts of the economy, and conversely reflex symptoms of other organs caused by aural disease.

This subject has, as yet, been very imperfectly recorded in the literature of pediatrics, and yet is of considerable importance in the symptomatology, prognosis, and treatment of children's diseases; and in order that our meaning may be thoroughly understood by our readers, we will, before discussing the subject in detail and reporting our cases, present briefly the following examples, illustrating the two branches of the subject:

CASE I. *Reflex aural symptoms; no aural disease.*—A. D., aged fourteen months, has eight incisor teeth, and from general appearances is probably in the process of cutting the first four molars; frequently suffers from pain in both ears, partial temporary relief to the pain being obtained by inflation of the Eustachian tubes; careful examination of the ears reveals nothing abnormal beyond, at times, an evanescent injection of the membrana tympani.

The pain gradually grew less severe, and the attacks less frequent, but the trouble continued until the molars were well up under the gums.

Diagnosis. Irritation of dental nerves in bone sockets; reflex irritation and suspense of vasomotor inhibition through the otic ganglion, causing dilatation of tympanic vessels, pressure, and aural pain.

CASE II. *Aural disease; reflex pulmonary symptoms.*—B. C., three and a half years old, has for some months had purulent inflammation of left middle ear; sometimes a discharge being present, and again ceasing for several weeks; but perforation of the membrana tympani always remaining unclosed.

December 24. For some days has been having an offensive purulent discharge from the ear, with a temperature varying from 99° to 101° F.; was out of doors in the morning and exposed to a cold easterly wind; did not seem well in the middle of the day; loss of appetite, chilly sensations and pains in limbs; throat slightly reddened; in the night, symptoms grew worse; the temperature went up to 105°, the pulse to 160, and the respirations to 75; nothing abnormal was found in the lung or larynx, and yet the quickened respirations were of a pulmonary type; examination of the ears showed nothing to account for the severity of the symptoms but the same purulent offensive discharge; temporary relief to the respirations and a reduction of temperature were obtained by inflating the Eustachian tubes and syringing the ear; the symptoms, however, returned on the following day, and when seen by another physician in consultation (respirations 75; temperature 104°; pulse 160) were pronounced to be those of pneumonia, until repeated and careful physical examination proved that the respiratory tract was not involved, and inflation and syringing were followed in a few hours by reduction of the respiration to 25, and the temperature to 98.2°; no further trouble arose in the case.

Diagnosis. Purulent inflammation of middle ear; reflex symptoms simulating pneumonia.

The intimate association of the filaments of the pneumogastric nerve with the ganglia of the sympathetic system, will suffice for the present as an explanation of the marked pulmonary symptoms existing in this case, where the source of the disease was evidently aural; we shall, however, later refer again to these pulmonary symptoms in a case somewhat more complicated than the one just cited; our first example also will be more clearly explained when we come to speak of the connection between the teeth and the ears.

One point especially to be urged in these cases of aural lesion of reflex origin is that the preliminary congestion occurs, in the great majority, in the upper portion of the tympanic cavity, and upper portion of the membrana tympani. The more immediate source of the blood supply of

this region is a tympanic branch of the carotid, sometimes two or three branches, passing through openings in that portion of the bony wall of the carotid canal which forms a part of the anterior inferior wall of the tympanic cavity.

These branches are necessarily short, of considerable size as compared with other sources of blood supply, proceed directly to their point of distribution, and have not, according to Politzer, the usual capillary terminations; these facts, taken in connection with the force of their circulation derived so directly from the carotid, make them especially liable to sudden and extreme dilatation on the suspense of vasomotor inhibition, and that the nervi-vasorum constituting the carotid plexus at this part of its course come largely from the otic ganglion (Woakes), and are hence placed in direct communication with distant parts, is the second of the important factors which explain the sudden and often unexpected implication of the middle ear in the diseases of other organs.

The sympathetic nerves of the lining membrane of the middle ear spring from the sympathetic plexus which accompanies the carotid artery in its canal. By means of orifices in the canal, several small branches of this plexus enter the tympanic cavity as nervi-carotico-tympanales, to form in its anterior portion together with the ramifications of Jacobson's nerve, and the nervus petrosus superficialis minor, the plexus tympanicus. From this proceed the finer nerves for the whole lining membrane of the middle ear.

The important influence exerted by the sympathetic nerves upon the vessels of the tympanic cavity is shown by Prussak's experiments on dogs.[1] The tympanum was opened, and while the portion of the sympathetic in the neck was galvanized, the vessels of the promontory and of the membrana tympani were examined by a magnifying glass. Shortly after the beginning of the irritation, the vessels became smaller, diminishing so as to be almost invisible; when the irritation ceased a considerable expansion of the vessels took place.[2]

We shall confine ourselves, for the sake of brevity, to cases implicating the middle ear, leaving out of consideration that large group of symptoms connected with disease of the internal ear which has already been investigated, and also not attempting to cover the whole ground of reflex middle ear affections, merely citing such illustrative cases as have happened in our practice.

A few words regarding the general mechanism of the phenomena represented in these cases, and so admirably spoken of by Woakes in his article on "Sources of Ear Affections in Infancy and Childhood," may be of aid in fully appreciating the otherwise inextricable complex of

[1] Prussak. Ueber Anastomosen zwischen den Gefässbezirken des Mittelohrs und des Labyrinths. Archiv f Ohrenheilkunde, xi.

[2] Politzer. Diseases of the Ear. English edition, p. 50.

symptoms which we are about to describe, and we can then take up the especial anatomical connections which serve to elucidate the individual case. Woakes says, "The anatomical mechanism, to the consideration of which these remarks lead, will be found in that portion of the nervous system constituted by the ganglia of the sympathetic chain and its afferent and efferent branches."

By far the most important fact in connection with the sympathetic system is that, with one or two exceptions, all sensori-motor nerves include fibres belonging to it. These sympathetic fibrillæ proceed to their companion cerebral or spinal nerve from that ganglion which is nearest to the latter when it issues from the spinal canal, or that join it from ganglia near which it passes in its course.

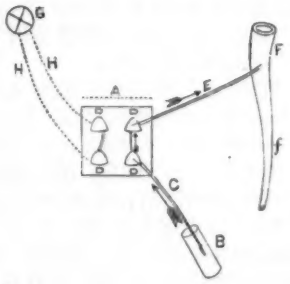
These sympathetic fibres are afferent in their function as regards the ganglion—*i. e.*, they convey impressions from the tissues to which they are distributed to the ganglion, or, beyond it, to centres within the spinal cord. They may be looked on as taking this ganglion in their course to the general vasomotor centre, hypothetically seated in the medulla oblongata, but it must not be forgotten that when these fibres thus enter a ganglion, they communicate with its caudate cells. This important fact brings them into communication with another set of nerves coming from very different directions to the same ganglion.

The second set of fibrillæ referred to as entering the ganglion, proceed by a similar course from the general centre, to join a given sympathetic ganglion; they then, similarly to the afferent sympathetic fibrillæ, mingle with the caudate cells of the ganglion, after which they quit it to seek their several destinations on the coats of the arteries. They are efferent or centrifugal in their function, conveying impressions from the general centre or the sub-centre constituted by their ganglion, to the arteries whose calibre it is their function to regulate; hence they are usually called vasomotor nerves. It will probably be found a not incorrect inference to regard these centres, whether primary or secondary, as playing a subservient part to the tissues which animate them. From this point of view, they will be reduced to the level of stations for receiving and transmitting impressions originating in the vital work of the areas with which they communicate, and, therefore, devoid of any power of originating such impressions, though they do undoubtedly modify the impulses passing through them, according as their vigor or vital energy is less or more than normal. We may conclude then that the sympathetic ganglia not only play the part of secondary centres or sub-centres, receiving and transmitting impressions quite independently of the general centre, but that they are also correlating organs, by means of which afferent tissue impressions from one direction are reflexly referred to a totally different tract, where they find expression as modifications of vessel calibre in that tract, the afferent impressions being

manifested through their medium as efferent impulses in the area to which they are thus reflected. In other words, the sympathetic ganglia are to be regarded as so many stations situated on the lines traversed by vasomotor impressions, in which the "points," so to speak, are managed and by means of which impulses are transferred from one line to another.

The following diagram will illustrate, in a general way, the foregoing remarks.

FIG. 1.



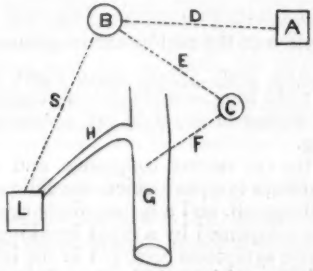
A, sympathetic ganglion.
B, sensori-motor nerve.
C, afferent sympathetic fibres from sheath of B.
D, caudate cells.
E, efferent sympathetic fibres proceeding to artery F.
F, artery dilated.
f, normal size of artery beyond the sympathetic influence.
G, general vasomotor centre.
HH, the dotted lines indicating the course of the fibres forming the roots of the ganglion in the spinal cord to the general vasomotor centre G.

We can now report a class of cases which represent the reflex connection between the ear and the larynx, and we will first indicate simply, by means of Fig. 2, the anatomical relations between the organs.

The irritation of the sensitive fibres of the auriculo-pneumogastricus distributed in the meatus, and to the membrana tympani, is reflected along the motor fibres of the superior laryngeal nerve, exciting in the larynx the act of coughing, by causing contraction of the crico-thyroid muscle. Now, where the original irritant, either in the meatus or in the membrana tympani, by its continued presence involves the vasomotor fibres associated with the auricular nerve, they conduct their impression to the ganglion of the pneumogastric, and thence it is deflected through a sympathetic fasciculus proceeding from it to the first cervical ganglion, this again through the nervi molles carries the impression to the external carotid artery and by its branches to the mucous membrane of the larynx, and as a result of reflected vasodilator impressions we may have congestion of the vessels supplying the mucous membrane of the larynx and perhaps effusion from these vessels.

As examples of reflex irritation, having their origin in this way, may be mentioned the hoarseness which sometimes accompanies the impaction of cerumen, and which disappears almost immediately after the removal of the mass, and the case of a young girl who was relieved of a

FIG. 2.



A, auditory canal, membrana tympani, and middle ear.
B, second ganglion of vagus.
C, first cervical ganglion of sympathetic.
D, auriculo-pneumogastric nerve.
E, sympathetic fasciculus connecting B and C.
F, nervi molles vasomotor connection with external carotid.
G, external carotid.
H, laryngeal artery.
S, superior laryngeal nerve.
L, larynx.

persistent laryngeal cough of several months' duration, accompanied by excessive expectoration, producing extreme emaciation, by the removal of a bead from the external auditory canal. The reverse of these laryngeal symptoms reflex from the ear, is represented by that class of cases noticed by Tröltsch and others, in which long-standing laryngeal disease is followed by deafness, and Gerhardt's case of severe pain in the ear, apparently depending on ulcerative destruction of the epiglottis.

The following is an interesting case of middle ear disease causing reflex laryngeal cough.

CASE III.—A child, five years old, who had been under our care for various diseases, and had developed purulent inflammation of the middle ear, was noticed, when under treatment for the otitis, to have a spasmodic, apparently laryngeal, cough, not to be accounted for by any abnormal condition of the air-passages. Whenever the discharge was checked, the cough was persistent, and resisted all the remedies which were employed to control it, but always grew less and frequently disappeared entirely, whenever the ear began to discharge again. This sequence of symptoms happened so frequently that there seemed to be no doubt that there was a connection of dependence between the discharge and the cough, and many an amusing appeal was made by the writers of this paper to each other, to allow the especial part to which they were directing their remedies, to remain quiescent, which only

ended by the baffled physicians sending the despairing parents abroad with the child, to a climate where a more complete cure could take place in the ear.

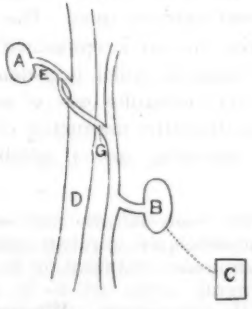
We will next report the reversal of the impressions conveyed by the filaments of the pneumogastric and the allied sympathetic fibrillæ, occurring in the second case described in this paper, in which aural disease was followed by pulmonary symptoms. This case is an illustration of the primary implication of the middle ear in pulmonary tuberculosis.

CASE IV.—A young man, twenty-three years of age, with marked tuberculosis of the right lung, complained of tinnitus aurium, and especially of a sense of fulness in the right ear, accompanied by decided impairment of hearing.

Examination of the ear showed congestion and œdema of the upper portion of the membrana tympani which was followed by perforation of the membrane of Shrapnell, and a serous discharge which soon became purulent, and was accompanied by a rapid breaking down of the tissues. A week later the same symptoms occurred in the left ear, with the same appearances, and the transition within four days to a well-established purulent otorrhœa. The left lung was also affected. In this, as in similar cases, a marked symptom is the absence of the severe pain which usually accompanies the inflammatory affections of the middle ear and membrana tympani. The anatomical connection of the parts is obviously through the pneumogastric ganglion B, Fig. 2, by means of the auriculo-pneumogastric nerve.

We can now, guided by the principles which we have above endeavored to elucidate, return to the study of those especial ear cases illustrated

FIG. 3.



A, tympanic cavity.
B, otic ganglion.
C, tooth.
D, internal carotid.
E, tympanal branch.
F, auriculo-temporal nerve.
G, auricular branch of auriculo-temporal nerve.

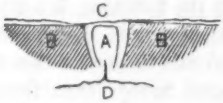
by the first case reported in this paper, in which there is congestion of the auditory structure arising from the irritation of teething, and we have

to ascertain how a congestion of the ear sufficient to give rise to severe pain can be caused in a reflex way by irritation connected with the teeth and gums, for clinically the occurrence of this phenomenon is quite frequently met with in infants during the dental periods. Woakes says:

"A considerable portion of the blood supply of the membrane of the drum is derived from an artery that leaves the internal carotid in the carotid canal and proceeds by a very short course directly to its destination. Being thus closely connected with a large arterial trunk, this small tympanal branch is very favorably situated for a speedy augmentation of its blood supply. Now the nervi-vasorum constituting the carotid plexus at this part of its course come largely from the otic ganglion. On the other hand, the inferior dental nerve supplying gums and teeth also communicates with this ganglion."

We thus arrive at a direct channel of nerve communication between the source of irritation, the tooth, and the vascular supply of the drum-head. The vessels of the membrana tympani become largely distended, and the attendant stretching of the tense and sensitive tissue in which this occurs occasions the pain constituting "earache."

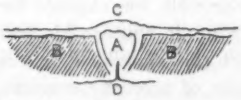
FIG. 4.



A, tooth in bone socket.
B, jaw.
C, gum, soft, not inflamed or swollen.
D, dental nerves.

Incidentally to the discussion of this subject of "dental earache," it does not seem entirely out of place to say a few words about gum lancing —a procedure which in former years was so universal, and at the present time is discountenanced to an equal degree by certain writers of authority in pediatrics.

FIG. 5.



A, tooth in bone socket.
B, jaw bone.
C, gum, tense, inflamed, swollen.
D, dental nerves.

During the dental periods two classes of irritation are met with: (1) Irritation of the dental nerves from pressure in the bone socket caused by pressure at the root of the growing tooth, and the accompanying

symptoms commonly spoken of as "teething;" in this class of cases we especially have the reflex earache spoken of above. (2) Irritation of the gum over the crown of the tooth from pressure, with symptoms of local irritation causing fever, and with general nervous symptoms.

Now we have here two exactly opposite conditions:

1. Pain from pressure at root of growing tooth.
2. Pain from pressure at crown of growing tooth.

To relieve the symptoms of (1), we can easily see that lancing the flat, soft, unirritated gum C, in Fig. 4, can be of no possible use; while what better treatment can there be for the symptoms of (2) than freely to lance the hot, swollen, and tense gum C, in Fig. 5, as we would where it is possible in any part of the economy to relieve symptoms of pressure by abolishing the cause of the pressure? Lance, then, not as formerly in every case, but knowingly in the class of cases in which our common sense tells us that the gum is crying out for the lancet as plainly as the felon demands the bistoury.

The relationship of superficial cutaneous disturbances of the face to congestions of the upper portion of the membrana tympani and tympanic cavity, as is sometimes observed in the facial eruption of measles and in the cases of which the following is a type, is somewhat complex, the arterial supply of the tympanic cavity being derived from various vessels. The anterior and middle portions are supplied: 1, by branches of the ascending pharyngeal artery (from the external carotid); 2, by branches of the middle meningeal artery which penetrate through the hiatus canalis Fallopiæ and the fissuræ petroso squamoso into the tympanic cavity; and, 3, by the internal carotid which sends branches through the bony walls of its canal.

In the case in question, there was evidently a rapid congestion of the middle ear, with no other readily assignable cause than the one mentioned, and the mechanism of the suspense of vasomotor inhibition in this and similar cases, is a question which it is intended to make the subject of further investigation.

A stout, healthy man, about thirty years of age, without history or evidence of previous ear-trouble, was exposed for an hour or more while driving to a cold, raw wind in winter; his body, head, and face were thoroughly protected, with the exception of the right side of the face and cheek, which surfaces were, of necessity, continuously exposed.

On entering the house a sense of fulness was experienced in the right ear, followed, at the end of an hour in a warm room, by a slight pain, which, by the end of another hour, had become very severe. At this period examination of the ear showed the membrana tympani congested and swollen above, but transparent below, and bulging outward; paracentesis of the membrana tympani in the posterior inferior quadrant liberated, not fluid, but air, which escaped with a sharp hiss, and was

followed, within another hour, by a serous fluid, the outflow of which rapidly increased for a time and then continued, gradually decreasing, for three days.

The fact that the bulging outward of the membrana tympani was due to compressed air, and not to accumulated fluid, as was shown by the paracentesis, is a marked symptom in this case, and was probably due to rapid swelling of the mucous membrane, first closing the Eustachian tube and then encroaching upon the lumen of the tympanic cavity sufficiently to compress the imprisoned air, and force the membrana tympani outward, and would imply that the first impulse to congestion occurred in the Eustachian tube and anterior portion of the tympanic cavity. If this conclusion is correct, the mechanism of the suspended vasomotor inhibition would be explained by the distribution of the superior maxillary nerve, which, with Meckel's ganglion, supplies the integument above and over the malar bone and that of the lower eyelid, side of the nose, and upper lip; while the connection with the ascending pharyngeal, tympanic branch, may be supplied, either by the pharyngeal nerve, which is sometimes given off from the ganglia, and sometimes directly from the Vidian, or by the small nasal branches of the Vidian which supply the membrane of the Eustachian tube.

The possible reverse train of symptoms to those of this case is presented in the following instance of reflex irritation: A boy, eight years old, who, from time to time, had had inflammation of the middle ear, but who for some months had been free from ear-trouble, after being out in the morning (the day was mild) came home with the right side of his face swollen; the swelling, which was neither red nor painful, and was not accompanied by fever, also affected the right eye, and extended over to the left eye; careful examination failed to detect any lesion to account for the symptoms, either in the mouth or elsewhere. Unfortunately the ear was not examined at this time.

In the night the child complained of slight pain in the right ear, followed in a few hours by a mucopurulent discharge, and by morning the swelling of the face had entirely disappeared, and there was a well-established otorrhœa.

In this connection we must now speak of an exceedingly important class of cases represented by the exanthemata, as here, also, there appears to be a reflex relationship between the face and the ear.

The implication of the middle ear in scarlet fever, for instance, occurs in two distinct ways: the first, and by far the most frequent, is that in which an inflammatory process in the middle ear is the secondary result of the inflammation of the mucous membrane of the fauces and nasopharynx, the first step in the mechanism of the aural implication being a more or less general congestion of the tympanic mucous membrane, blood stasis, due to the swelling of the mucous membrane of the Eus-

tachian tube and the consequent closure of that passage, a condition which permits the rarefaction of the air in the tympanic cavity, and consequently still further favors congestion in addition to the interference with the venous circulation.

In the second instance the primary congestion occurs principally in the upper portion of the tympanic cavity and membrana tympani, and is coincident with the facial eruption, a sequence explainable on the reflex hypothesis; the same sequence is still more frequently observable in the facial eruption of measles.

An illustration of this second instance was beautifully represented in a patient coming under our notice with an intense efflorescence of measles on the face and no aural symptoms; on examining the ears, however, a marked congestion was found in the upper part of the membranæ tympani.

The next and last case of our series represents a rather more extended line of reflex symptoms, and though resembling some of the other cases, is interesting as presenting a combination of reflex phenomena from the face and throat to the ear and thence to the lung.

A girl, aged nineteen months, well until March 6th, when she began to have cough, coryza, and lachrymation; these symptoms continued on the 7th, and an efflorescence of measles declared itself on the face. Temperature 104½° F., pulse 150, respiration 40; on the 8th there was no extension of the efflorescence, and at 4.30 P.M. there was a general eclamptic attack, but consciousness returned at 5 P.M., cough less and apparently caused by a catarrhal condition of the pharynx and larynx, lungs normal, efflorescence appearing on body and limbs; in the night great restlessness and apparently pain, which, however, could not be localized, though it was suspected to be in the chest, as the respirations began to increase and to be of a short grunting character; these symptoms continued until at 5 A.M., March 9th, the respirations numbered 70 to 80 in a minute, and the picture was that of a pneumonia; frequent auscultation and percussion revealed nothing abnormal in the lungs or heart; at 6 A.M. a slight mucopurulent discharge was noticed on the pillow, coming from the left ear; the temperature was then found to be a degree lower, but the rapid breathing continued. The left Eustachian tube was now inflated, and in about ten minutes the respiration was almost normal; in the further progress of the disease, the measles ran a normal course, but the right ear was also affected and both ears continued to discharge. A number of times the rapid respiration returned, and was always promptly relieved by the use of the air douche.

Rational treatment of these cases, then, can only be accomplished by a thoroughly scientific anatomical and physiological knowledge of the reflex phenomena, which, from the hypersensitive condition of the child's

nervous system, play a much greater *role* in childhood than in adult life and render a diagnosis much more difficult.

Finally, from what has been said, we must admit the great importance of recognizing whether symptoms are real or reflex, tracing them from one end of the labyrinth of nerves to the other, and following them out with the minutest detail, for in this way only can we speedily reach the goal of recovery through definite and exact diagnosis, with resulting appropriate prognosis and treatment.

YELLOW FEVER:

ITS TRANSMISSION BY MEANS OF THE CULEX MOSQUITO.

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In the month of May, of last year, when the yellow fever epidemic was commencing at Vera Cruz, Dr. Carmona, of Mexico, inoculated six prisoners with the dried residue of yellow fever urine. In two of the six, the local symptoms of the inoculation were immediately followed by those of fatal yellow fever, and, a few days later, both died *on the same day* (Carmona, *Leçons sur l'étiologie et la prophylaxie de la fièvre jaune*, p. 265). This unfortunate result agrees with the views that I have entertained since 1881, viz., that whereas the disease is not spontaneously transmissible by infection through the air nor by contact, it can be communicated by inoculation. In searching for a natural agent capable of fulfilling this condition, I was led to fix upon the Culex mosquito as the most likely one. Before submitting, however, the experimental results which, so far, appear to confirm my theory, it will be necessary to describe the habits and peculiarities of this insect.

Most books on natural history inform us that only the *female* mosquito stings human beings and animals for the purpose of sucking their blood, the *males* feeding only on sweet juices or nutrient liquids. The fecundated females, in cold climates, hibernate during winter, in a state of apparent death, in dark corners, in cellars, etc., to revive with the return of warm weather, when they will lay eggs and propagate their species. I was unable, however, to ascertain from previous writers whether gnats, in general, suck blood more than once, how long they live after their first bite, and many other particulars essential for my investigation. I was, therefore, obliged to undertake a systematic study of the species generally found in Havana, to which alone the following remarks must be understood to apply, leaving future inquiries to deter-

mine whether the same may be true of others that are known to exist in the interior of the island and in foreign countries.

Two species of mosquitoes are commonly observed in Havana. One, the Culex cubensis (La Sagra), *zancudo*, or long-legged mosquito, is from five to six mm. in length, of a yellowish or fawn color, with long, thin legs, and no noticeable spots upon its body or legs. This species is nocturnal, coming out exclusively at night and retiring before daybreak; they are often found in the morning, in a state of torpor, gorged with blood, inside of mosquito nets. I have never succeeded in getting these *zancudos* to sting a second time after they had once become filled; but as they can be kept alive, by feeding with sugar, over a period of forty days, it is unlikely that they should not bite more than once when in a state of freedom. The female of this species lays its eggs pretty much in the same manner as the European gnat, described by Reaumur, forming a boat-like aggregate of eggs, where over one hundred are closely packed together, standing upright, side by side, the tiny raft being left floating upon the water.

The other species is the Culex mosquito (Robineau Desvoidy), lately described, I am told, as "Culex fasciatus." There are several varieties, principally distinguishable by their dimensions and shades of color; some being small and nearly black, while others are stronger, almost as large as the nocturnal species, and of a brown or steel color; the general characteristics being the same in the two or three varieties that I have observed.

The body of the C. mosquito is dark colored, the ventral surface coated with a thick skin and marked with gray or white rings; on each side of the abdomen is a double row of white dots, between which stretches a transparent membrane through which the blood can be seen when the insect is full. The most striking feature consists in five white rings on its hind legs, corresponding to the tarsal and metatarsal articulations. Others less apparent are on the fore and middle legs; white spots are visible on the sides of the thorax and front of the head, while the corselet presents a combination of white lines in the figure of a two-stringed lyre. The wings, when closed, do not cover the end of the body.

The *males* are known by their bushy antennæ and long palps lying close to the proboscis, and curved outward near the point; whereas the *females* have delicate antennæ and short palps drawn up close to the root of the proboscis.

The female of this species lays its eggs in a different manner from the *zancudo*, not in a boat-like aggregate but singly, having previously deposited a viscous substance through which they lie scattered in irregular groups, either upon the liquid surface or upon the sides of the vessel, close to the water's edge.

The above details are easily made out with the aid of a magnifying

glass. I need not enter upon a minute description of the six pieces which constitute the sting of the female mosquito (labrum, mandibles, maxillæ, and tongue); suffice it to say that, in the act of biting[1] and sucking blood it represents a hollow lance, from 2 to 2½ mm. long, $\frac{1}{30}$ mm. broad at its base and about $\frac{1}{40}$ near its extremity. The point is shaped like that of a writing pen, its edges being provided with ten or twelve sharp teeth decreasing in size as they reach the finely pointed extremity. The shaft presents transverse serrated ridges, which must act somewhat like the teeth of a conical file; these ridges, as well as the terminal teeth, belonging to the mandibles which are closely applied upon the sides of the labrum.

The sting remains enclosed in a brown, hairy sheath, excepting when it is introduced into the skin; during this operation, the sheath, which is slit in front to within a short distance of its point, bends backward and the sting appears like a fine wiry lance. This generally penetrates to a depth of from 1½ to 2 mm. before a bloodvessel is reached of sufficient calibre to allow blood to be drawn. The insect requires from one to five or seven minutes to complete this operation. When once it has fairly implanted its sting, the mosquito can be easily covered with a glass tube or phial and imprisoned. I have generally resorted to this means in order to procure live specimens, so as to be sure of their efficacy for my experiments.

The C. mosquito is diurnal and crepuscular, making its appearance early in the morning, again between 9 and 10 A. M., and in the afternoon until night. Stragglers may be met as late as 10 or 11 P. M., and in close, dark rooms they are generally felt or heard throughout the day (in summer). The males are the first to make their appearance, apparently attracted by the emanations of human perspiration from the body or from worn clothes; they keep flying about until the females appear, and it is only after pairing that the new females are able to sting and draw blood. When caught as they emerge from their pupa-case, they often attempt to do so, but their proboscis bends, either from want of rigidity of the sheath, or from some obstruction at its point, and the lance fails to pierce the skin. Immediately after pairing, however, the insect is ready to sting.

I have found no difficulty in getting this species to do so as often as it has completed the digestion of the blood previously sucked, but not before an interval of from two to five days (according to the season and weather), when the insect had been able to fill itself completely. As a proof of the remarkable resistance of this insect to rough usage, and in order to exemplify some of its habits, I copy the following record from my note-book:

[1] This term is used in accordance with general custom notwithstanding its obvious inaccuracy.

January 13, 1881. A fresh female C. mosquito was caught in the afternoon and allowed to fill with blood off my hand, being retained captive in a glass tube closed with a muslin cap.

15th. Filled again from my hand, biting through the muslin cover.

16th. Strong and active; still distended with blood, refuses to sting.

17th. Stings my hand readily through the muslin and fills.

18th. Though still retaining some blood, bites my hand readily through the muslin. Two hours later, not having apparently taken its usual quantity of blood at the previous bite, it stings again and sucks during two minutes. (Probably the interposition of the muslin interferes with the act of sucking.) At this period, knowing that only the fecundated females draw blood, I introduced a small quantity of water into the phial, in order that eggs might be laid. The insect immediately goes to the water, and after discharging a whitish viscid substance upon the sides of the tube, deposits some white eggs, close to the edge of the water. Six of them were disposed vertically one above the other. The rest of the day the insect was busy besmearing every part of its body (legs, wings, and head included) with a viscid substance collected with the hind legs from the posterior extremity of the body. The white eggs turned black after some hours.

19th. Continues laying eggs.

20th. More eggs; some upon the sides of the phial; stings my hand and sucks readily. The water becomes colored red from the excrementitious particles discharged into it.

21st. Refuses to sting; has lost its left hind leg.

22d. Still laying. One small wriggler has been hatched. Cannot be got to sting.

23d. More eggs laid. Refuses to sting.

24th. The water is teeming with wrigglers. The insect was now transferred to another phial with water. Stings my bare hand very readily, taking about seven and a half minutes to fill.

25th. Refuses to sting. No new eggs.

26th. Bites readily, but, unable to reach a bloodvessel, withdraws its sting, and after feeling the surface of the skin, finds a more convenient spot, where it fills completely.

27th. Refuses to sting. In moving the phial the insect was soaked by the water, but recovered.

28th. Has laid over fifty eggs since yesterday evening; bites readily, and fills from my hand.

29th. Refuses to sting. No new eggs. Most of the white marks upon the body of the mosquito have nearly disappeared.

31st. Bites readily, and fills from the palm of my hand.

February 2. Bites, and fills from my thumb. Having been transferred to another phial with fresh water, was found lying partly submerged and motionless. On filtering off the water the insect revived. It was then transferred to a new dry phial for the purpose of continuing the observations during my trip to New York.

3d. Still retains some black blood; has lost its left foreleg.

4th. Bites, and fills from my hand. Taken on board of the steamer starting for New York.

5th. Refuses to sting.

6th. Bites, and fills readily.

7th, 8th, 9th, 10th. Alive, but refuses to sting. The weather was quite cold, the last three days passed off Sandy Hook.

12th. The phial, packed in a valise, was sent by express to Orange, N. J.; the insect arrived nearly dead.

13th, Dead, after thirty-one days captivity, having bitten twelve times, and laid probably over two hundred eggs.

From inquiries made on the steamer, I ascertained that mosquitoes are rarely felt on board during the three or four days that the vessel is detained in the port of Havana, where she lies at a distance from the wharves. In New York, where the ship goes to the wharf, they are apt to be more troublesome, but generally disappear soon after the vessel has left the port.

Mosquitoes are observed in Havana all the year through, but much more so from May to October. In winter they are rare when the temperature falls below 70° F. Last year (1885) has been an exception to the general rule. Mosquitoes, especially the diurnal species, were difficult to procure throughout the summer; but became more numerous in the latter part of September, October, and November. A remarkable scarcity of yellow fever cases was likewise observed in the summer months, and I called attention to this coincidence at one of the sessions of our Academy. In October and November more cases of the disease were signalled, both in hospital and private practice, than in the previous months of the year, although the summer heat had been more intense than usual, and had abated toward the end of September, in October and November the weather being quite mild.

Although great differences are observed in the duration of the successive phases of development of the C. mosquito, the following data may be taken as a fair average: Every mosquito that stings may be considered as a fecundated female, and will probably lay eggs within a few days after its bite, provided it can find water upon which to lay them. In water-jugs standing in bedrooms, the insect is often found depositing its eggs either on the sides of the jug or upon the water. The eggs are commonly hatched, producing minute wrigglers, between the second and fourth day, in summer; some are delayed much longer, and those that are deposited outside the water may remain a long time in the dry state without losing their vitality. The wrigglers grow more or less rapidly according to the nutritive material contained in the water, the temperature, etc., but they probably pass into the pupa stage within twelve or fourteen days. This stage is always short, not lasting more than two or three days, the fully developed mosquito emerging from its aquatic case a fortnight or three weeks after the egg was laid.

From the above data it will be understood how a single infected mosquito, which happens to be conveyed to a healthy locality, when the temperature and altitude are appropriate, might, if my theory be true,

inoculate the disease to any liable subject whom it should there sting; and, according to the usual rate of incubation, at the end of a fortnight or three weeks, the consequent attack of yellow fever would be at its height. In the meantime the imported insect would have produced a whole brood of its own species, probably in the vicinity of the place where the patient is lying; thus providing the necessary conditions for the subsequent propagation of the disease.

It remains, therefore, to be determined whether the limits of temperature and of altitude within which the C. mosquito is able to exert its functions, agree with those which are known to limit the propagation of yellow fever. The following simple experiments appear conclusive on these points:

1. Let a female C. mosquito, of medium size, be placed in a test-tube with a thermometer passing through the cotton-plug, and the tube dipped in water, the temperature of which is gradually lowered by the addition of ice and salt. The following effects will be observed:

Between 66° and 60° F., the insect is benumbed, scarcely moving, sometimes falling to one side in a state of apparent death.

Between 60° and 32° F., apparent death more pronounced.

If the water be allowed to return to its former temperature:

Between 60° and 65° F., the insect shows signs of life.

Between 65° and 68° F., it is able to walk and fly.

Above 77° F., it recovers its former agility, but is at first unable to bite; indeed, if the cooling has reached 32° F., or below, the insect generally dies within a short time.

The larger varieties seem, however, to bear low temperatures better than the small, and a difference is observed according as the change is effected more or less rapidly.

2. In order to test the limits of heat, let a test-tube, similarly disposed, with a thermometer and live mosquito, be suspended inside of a large empty flask, standing in a basin of hot water. The following effects will be noted:

Between 95° and 100° F., the insect appears uncomfortable.

Between 102° and 105° F., remains motionless in apparent death, but is apt to recover and to sting again when restored to a normal temperature.

From 105° to 110° F., apparent or actual death; the insect, if it does revive, not being able to sting again, and generally dying within a few hours.

3. As regards barometric pressures, the experiment would best be tried in such localities as Vera Cruz, Orizava, and Mexico, or in Rio Janeiro and the heights near it, but, failing that resource, I have contrived the following plan:

A female C. mosquito is placed in an empty bottle connected with an aneroid barometer, and a suction flask raised to a proper height:

At rarefied pressures corresponding to 2000 or 3000 feet, the insect becomes at first unable to fly, but if withdrawn will bite and draw blood after a while.

At rarefied pressures corresponding to 4000 or 6000 feet, the general effects are more marked, but the insect does not die, and seems even to

get accustomed to the new state of things; but when withdrawn continues weak, and unable to sting for several hours.

We are thereby led to infer that the C. mosquito, when suddenly transferred to heights above 3000 or 4000 feet, must find it difficult to exert its functions, and that it would never, of its own accord, seek elevations which render its flight difficult. This conclusion agrees, moreover, with the remarks of Baron von Humboldt, who carefully observed the mosquitoes of Central America.

From the above experiments it is inferred that the limits of functional activity for the C. mosquito are: as regards temperature, between 60° and 100° F., the insect reviving, however, after having been chilled to near 32° F., or warmed to 105° F.; as regards altitude, from the level of the sea to 3000 or 4000 feet. Now the limits which most observers assign to the propagation of yellow fever are temperatures ranging from 60° F. to 90° F. ("Barton's Reports," 1852, pp. xiii. and 283); a general temperature of 32° F. having, however, proved ineffectual to prevent the recurrence of the disease (in the case of the "Plymouth"), when a tropical temperature was produced. As regards altitudes, the highest limit at which it has been observed seems to be 4000 feet above the level of the sea.

Before dismissing the subject under consideration, I must add that the mosquito finds within the precincts of a dwelling all the requirements for its development, growth, and reproduction; dark corners to hide in, stagnant water in which to lay its eggs and develop its larvæ, and substances for the female insect to feed on, being the principal conditions. A forgotten tub, or pool of stagnant water in a back yard or garden, is often chosen by the insects as a place of rendezvous where they congregate and lay their eggs; the larvæ, in the meantime, going through their successive stages of development. The mother insect when about to die, has been observed to resort to the water where its larvæ are growing, its cadaver remaining floating upon the liquid surface. The nocturnal species will naturally lead a more stationary existence than the diurnal; for the latter, in trying to sting during the busy hours of the day, will often have to follow its intended victim from house to house, returning again and again after being driven off, until it succeeds in planting its sting and filling with blood. Wherever the bite happens to have been successful, there the mosquito will, in all likelihood, take up its quarters; it will develop a new brood and continue to sting all that come in its way, unless again led off by a chance peregrination.

Before relating the following six cases of experimental yellow fever, it will be proper to explain the general principles by which I was guided, and the process which I have followed in my inoculations.

The general disposition of the C. mosquito's sting has already been described, but for our present purpose it may be regarded as a slender

hollow needle from $\frac{1}{80}$ to $\frac{1}{40}$ mm. broad and 2 mm. long, with its sides roughened by a series of transverse ridges and its point armed with teeth. This needle penetrates through the skin until it reaches one of the capillaries of the corium, generally to the depth of 1 to 2 mm., remains in position during a space of from one to five minutes, and, after being withdrawn, will continue protected by its sheath against external agents until the insect's next bite. I have been able to prove that the sting often retains spores of microscopical fungi, which may be made to develop by keeping the proboscis in a sterilized cell, and I once found upon the side of the sting a finely developed bunch of spores like those observed in yellow fever blood cultures by Dr. Sternberg (*Bacteria*, 2d edition, p. 426), and classified as "Penicillium;" whence it is to be inferred that it may likewise retain upon its outer surface or inside of its sheath, such minute disease-germs as are generally believed to occasion most of the zymotic diseases. If so, the sting of the mosquito having been impregnated with the animal juices during the operation of stinging, may constitute an appropriate soil for the preservation or even for the culture of those germs; might it not, indeed, be the "intermediate host" necessary for some phase of their development?[1]

For the purpose of carrying into effect this novel inoculation, my plan has been to catch a female mosquito while in the act of stinging and before it has filled, by inverting an empty phial or test-tube over it and closing the mouth of the phial with a plug of cotton-wool. The insect is thus in readiness to renew its bite as soon as it has become accustomed to its place of confinement. Indeed, it will die of inanition if not allowed to do so in the course of a few hours (four to twelve in summer). The captive is then taken to a confirmed case of yellow fever, and the tube being inverted and the cotton plug carefully removed over the bare surface of the patient's arm or hand, the insect is allowed to fill at leisure with the tainted blood, and the plug reinserted. After this blood has been digested, generally between the second and fourth day, the mosquito is applied in the same manner to the arm of a subject liable to the disease, and then allowed again to fill itself completely. This is the inoculation; and when successful, at the end of from five to twenty-two days incubation, the first symptoms of mild yellow fever will manifest themselves in the inoculated subject.

The process, as above described, is simple enough, but it must be observed that in order to obtain available results several conditions are necessary. A case of yellow fever must be at hand at the period most favorable for the transplantation of the virus, which, according to my

[1] In resolving to experiment upon human subjects, I relied upon the inference that the quantity of virus carried by a single sting must be a minimum dose, capable of producing only the mildest forms of the disease ever observed in nature, and that a number of such bites would be necessary to occasion a dangerous attack.

experiments, seems to be from the third to the sixth day. A liable subject must be found willing to submit to the process, supposed to be free from previous infection, and likewise willing to keep clear from infected places during the incubation, yet within easy reach of observation.

The nocturnal species of mosquito can easily be procured, but, as before stated, I have never succeeded in making that particular kind sting more than once; whereas, the diurnal, which is the only one that I have experimented with, does not generally come in swarms, but singly, or in small numbers, making but little noise, and its bite is usually unfelt, at least by the acclimated.

These requisites, so difficult to be obtained by one whose leisure hours, in the midst of an active professional life, are necessarily limited, will account for the small number of my experiments, some twenty-four individuals only having been inoculated by me since June, 1881. Of this number only one has died of yellow fever; he had been inoculated in November, 1883, without any visible result, and was attacked, after severe exposure, in June, 1884, with a malignant form of yellow fever (it is the second case of the series referred to elsewhere as instances of contagion). Of the remaining twenty-three, two left the country, or were lost sight of the first summer after inoculation, the rest having remained under observation during periods ranging between one and four full summers in the city of Havana. Six of these inoculations were followed, within the ordinary limits of yellow fever incubation (five to twenty-two days), by an attack of fever, the exact counterpart of mild attacks of yellow fever, of which I have kept careful notes, and which were proved by subsequent observation to have conferred immunity. Eleven inoculations, though not followed by any morbid manifestations within the limits of incubation, or, at most (in three cases), by a trifling ephemeral fever, appear to have likewise conferred immunity, in so far that the persons have resided in the city of Havana, in constant exposure to the infection, during periods of one or two summers, without experiencing any attack of the disease. Finally, in four instances, not followed by any immediate morbid manifestation, at the end of several months a mild attack of yellow fever (without albuminuria) was observed.

These figures are not considered, from a statistical point of view, to afford any definite clew either in favor of or against the prophylactic value of my inoculations when not followed by a mild attack of the disease, and it is rather upon the circumstances attending my six successful inoculations that I rely in order to prove the aptitude of the C. mosquito for transmitting yellow fever. If this be once admitted, it must follow that the disease is actually so transmitted, since it must constantly happen, in a place like Havana, that unacclimated subjects

are stung by mosquitoes which have previously bitten yellow fever patients.

My first inoculations by means of mosquitoes were performed under the following circumstances: A group of twenty unacclimated soldiers, who were quartered on the heights of the Cabanas, on the other side of the bay, were picked out for my observations, and were only allowed to cross the bay in batches of four or five on the days they were sent to my office, where I tried their blood for hematimetric purposes. Five of the group were inoculated by me at different dates between the 29th of June and the end of August, 1881. The first three were followed, at the end of five or fourteen days' incubation, by an attack of fever of several days' duration, diagnosticated by the attending physicians at the military hospital as "regular yellow fever" in the first case, and "abortive yellow fever" in the two others. The fourth inoculated soldier suffered only from continued headache, and, on the fifteenth day after the inoculation, came to my office with slight fever (temperature 100.7° F., pulse 100), but was not laid up. The fifth did not return to my office. I was informed that he had felt poorly a few days after the inoculation, but was not laid up. I have been able to trace the history of these five cases until the beginning of last year. None of them had been reported, up to that date, as subsequently attacked with yellow fever. Of the remaining fifteen soldiers of the group, upon whom the inoculation *was not performed*, none were attacked with yellow fever during the period of my observation, June 28 to September, 1881.

Case I.—On the 30th of June, 1881, one of the soldiers of the above group (F. B.), twenty-two years of age, three months in Havana, having had previously some attacks of intermittent fever, was inoculated by means of a mosquito which had bitten, two days before (June 28th), a patient in the fourth day of yellow fever and who died thirty-six hours later.

July 14. The inoculated soldier was taken sick and went to the Military Hospital, where I was only able to see him on the 16th (third day of his illness). I found him with slight fever, slight yellowish tinge of conjunctivæ, pains of invasion almost disappeared; the urine gave distinct evidence of albumen with heat and with nitric acid, not having presented any in the morning. The clinical report of the attending physician, together with my own observation, gave the following result.

1st day, July 14. Invasion preceded by a few days of discomfort.

2d day. Morning: Temp. 101.8° F.; pulse 92; resp. 28; face and eyes injected; intense headache; slight epigastralgia; pains in the spine; tongue coated; no vomiting or other remarkable symptoms. Treatment: Ipecacuanha four grammes in four doses; cream of tartar lemonade; absolute diet. Evening: Temp. 100.4° F.; pulse 88; resp. 26; headache less intense. Night: Intense thirst; urine scanty.

3d day. Morning: Temp. 99.6° F.; pulse 72; resp. 34; skin pale; slight yellowness of conjunctivæ; congested gums; epigastralgia; no nausea; no albumen in the urine. Evening: Albumen detected in the urine. Night: Same condition; insomnia. Treatment: One gramme of sul-

phate of quinine in ten doses; cream of tartar lemonade; mustard plasters to the extremities.

4th day. Morning: Temp. 98.9° F.; pulse 72; resp. 34; no headache; some appetite; gums give a little blood on compression; urine treated by heat and nitric acid, gives a more abundant precipitate of albumen. Evening: Normal temperature and pulse.

5th day. Temp. 98.9° F.; pulse 78; respiration normal; slight jaundice; urine contains albumen.

6th day. Convalescent; urine not examined; broth allowed.

7th day. Continues well.

12th day. Cured.

The distinct evidence of albumen in the urine, notwithstanding the mildness of the fever and general symptoms, leaves no doubt regarding the diagnosis, which was unhesitatingly reported as "regular yellow fever."

CASE II.—Another soldier of the group (A. L. C.), seventeen years of age, three months in Havana, was stung on the 22d of July, 1881, by a mosquito which had bitten, on the 16th, a bad case of yellow fever (in fifth day of his illness), and on the 20th had been made to sting my own hand.

July 27. Five days after the inoculation, this soldier entered the Military Hospital with an attack of fever, which was qualified as "abortive yellow fever." When seen by me on the 31st (fifth day of his illness), there was scarcely any fever, and the urine contained no albumen. I was unable to procure the clinical notes of this case.

This observation would tend to prove that an infected mosquito does not always lose its virulence by an intermediate bite. This is not always the case, however, for on a subsequent occasion, having inoculated with a mosquito which had bitten two yellow fever patients, a person who seems thereby to have acquired subsequent immunity, the same insect was afterward made to sting a second non-acclimated person, who had a severe attack of yellow fever six months later, from which he fortunately recovered. This case has not been included among my regular inoculations, being considered a distinct experiment.

CASE III.—A third soldier (D. L. F.), twenty years of age, and six months in Havana, was inoculated on the 31st of July, 1881, with a mosquito which had bitten, two days before, a fatal case of yellow fever in third day of the disease. On the 5th of August (five days after the inoculation) the soldier came to my office, presenting temp. 39.6°, and pulse 110. He was at once sent to the Military Hospital, where the following clinical record was taken:

1st day, August 5. Evening: Temp. 103.2° F.; pulse 112; intense headache; slight epigastralgia; flushed countenance; intense thirst. Treatment: Valerianate of quinine two grammes in twenty pills; mustard plasters to the extremities; cold applications to the forehead.

2d day. Morning: Temp. 100.7° F.; pulse 72; resp. 28; the pains have lessened; some nausea; subicteric tint; urine pretty abundant, contains no albumen. Evening: Temp. 101.8° F.; pulse 88. Night: Temp. 100.7° F.; pulse 82; insomnia.

3d day. Morning: Temp. 99.6° F.; pulse 76; perspiration; no pains. Evening: Temp. 100° F.; pulse 80; restlessness.

4th day. Apyrexia.

The diagnosis, as stated in the clinical report, was "abortive yellow fever."

The following year (1882) my attention was principally devoted to the observation of mild forms of yellow fever, in order to collect reliable data available for the appreciation of my experimental cases. In 1883, however, I resumed my experiments, obtaining three successful inoculations, one of which (Case V.) is particularly worthy of notice.

CASE IV.—A Spaniard (J. B.), employed as a servingman to my friend Dr. Delgado, twenty-five years of age, nine months in Havana, having never been ill since his arrival, was inoculated on the 22d of June, 1883, by two mosquitoes, which had both bitten, two days before, a fatal case of yellow fever in the sixth day of his illness.

July 9th (seventeen days after the double inoculation), J. B. was taken ill with symptoms of yellow fever. The following morning an emetic was administered, followed by a dose of castor oil; no other medicine being given in the course of the illness, and absolute diet maintained until the sixth day, only water being allowed.

2d day. Morning: Temp. 101.3° F.; pulse 80; face flushed; pains in the loins. Evening: Temp. 101.8° F.

3d day. Morning: Temp. 100.4° F.; pulse 70; no albumen in the urine. Evening: Temp. 101.8° F.; face less flushed; straw color of the conjunctiva; intense thirst; anorexia.

4th day. Morning: Temp. 99.5° F.; pulse 68; no albumen. Evening: Temp. 101.3° F.; pulse 70.

5th day. Morning: Temp. 100.4° F.; pulse 68; no albumen; conjunctivæ yellowish; gums do not bleed on pressure.

6th day. Morning: Temp. 101.4° F.; pulse 72. Midday: Temp. 103.1° F; pulse 72. Evening: Temp. 103.2° F.; pulse 70.

7th day. Morning: Temp. 98° F.; pulse 54; yellowish tinge on the forehead; no pains; has perspired freely in the night; milk allowed. Evening: Temp. 98.6° F.; pulse 52; appetite returning; rapid convalescence.

The general type of the fever, with remission on the fourth day, and defervescence on the seventh, bears a strong resemblance to some forms of natural yellow fever that I have observed. The patient has since remained protected.

The following case is remarkable from the circumstance that most of the conditions were fulfilled that can well be secured in the vicinity of Havana, in order to avoid the chances of independent infection from other sources besides the inoculation. The place selected for the experiment was the same country residence or "Quinta" rented by the Jesuit Fathers since 1872, near the "Quemados de Marianao," to which Dr. Stanford E. Chaillé has alluded in his remarkable report as President of the Yellow Fever Commission which visited Havana in 1879 (*Annual Report of the National Board of Health*, Washington, 1880,

p. 276). In the course of eleven years (1872–1883), the only case of yellow fever developed among the many liable subjects who had spent their summer vacations at this place, during their stay, occurred in 1880 in a young priest who had been going backward and forward to Havana during the previous fortnight, and who was attacked with the disease during his last visit to the city, where he remained and died. It is more than likely that he had contracted the infection in town, and not at the Quinta.

Toward the end of June, 1883, several young priests and a servant, all unacclimated and having arrived from Spain the previous autumn, happened to be staying at this country-place, and I availed myself of their willingness to submit to my inoculation experiments.

Case V.—P. U., one of the unacclimated priests, a young man of spare habit, having gone to the "Quinta" toward the end of June, 1883, did not again visit the city nor the neighboring town of Marianao until the following September. On the 15th of July a first unsuccessful attempt was made with a mosquito contaminated from a case in the seventh day of yellow fever; a full month was then allowed to elapse before a second attempt on the same person.

August 18, 1883, P. U. was inoculated with a mosquito which had bitten on the 13th and 16th two separate cases of yellow fever, each in the sixth day of their illness.

On the 26th of August, eight days after inoculation, P. U. was taken ill about 8 A. M. with headache, pains in the loins, and fever (temp. 100.7° F.). I saw him at 4 P. M. and from that time followed the case, keeping accurate notes of the symptoms.

1st day. 4 P. M., felt very poorly, complained of headache and pains in the loins and calves; face flushed and covered with perspiration; eyes injected; was sent to bed, and after a while presented: Temp. 102.2° F.; pulse 100, dicrotic. Treatment: Castor oil with lime juice. Night: Temp. 102.3° F.; pulse 104; vomited five or six times through the night and had several passages; thirst; eyes injected.

2d day. Morning: Temp. 101.3° F.; pulse 88; resp. 20; eyes injected, without yellow tinge; urine natural in appearance. Evening: Temp. 101.4° F.; pulse 90; resp. 30; somewhat drowsy; urine less copious than usual, acid reaction, not affected by boiling. Treatment: Hyposulphite of soda; boiled orangeade for common drink.

3d day. Morning: Temp. 101.8° F.; pulse 80; resp. 27; urine contains no albumen; restless night, insomnia; tongue white; thirst; face less flushed. Evening: Temp. 101.8° F.; pulse 84; resp. 26; subicteric tinge of conjunctivæ. Same treatment.

4th day. Morning: Temp. 100.4° F.; pulse 60; resp. 27; subicteric tinge more marked; the pains have ceased; urine scanty, contains biliverdine, but no albumen; the gums bleed on pressure. Treatment: Chlorate of potash. Evening: Temp. 101.4° F.; pulse 80; restlessness; urine scanty, no albumen; thirst; anorexia.

5th day. Morning: Temp. 101.1° F.; pulse 76; resp. 29. Evening: Temp. 101.8° F.; pulse 83. Night: During a thunderstorm became very nervous; ten hours without passing urine; urine presents traces of albumen. Treatment: Morphia syrup.

6th day. Morning: Temp. 101.8° F.; pulse 72; urine not altered by ebullition; quiet night; expectorated some bloody sputa. Broth allowed. Evening: Temp. 100.7° F.; pulse 75.

7th day. Morning: Temp. 99.6° F.; pulse 62; resp. 20; subicteric tint of conjunctivæ; some bloody sputa; gums bleed on pressure; urine scanty, no albumen. Evening: Temp. 98.9° F.; pulse 57.

8th day. Morning: Temp. 98.7° F.; pulse 58; subicteric tint of conjunctivæ.

It is worthy of notice that this patient in his normal condition presented a *polyuria insipida*, amounting to over two litres per day; the secretion becoming immediately reduced from the invasion of the attack.

The patient spent two summers in the city after this attack, visiting cases of yellow fever, and having witnessed two severe ones in the town-college where he resided, without experiencing any inconvenience.

CASE VI.—The unacclimated servant before mentioned, who was staying at the Jesuits' "Quinta" with the preceding case, and upon whom a first unsuccessful attempt had also been made on the 16th of July, was again inoculated on the same day as P. U.

August 18. This servant (J. S.) was stung by a mosquito which had bitten, three days before, one of the patients of yellow fever from whom the previous case was produced. J. S. remained at the "Quinta" until September 3d, at which date he had to return to the college in town. He was taken ill on the 9th and went into a private hospital, where I was able, with Dr. Delgado's assistance, to follow up the case.

1st day. Twenty-two days after the inoculation, taken ill in the evening, with fever, headache, and pains in the loins.

2d day. Midday: Temp. 103.1° F.; pulse 94; copious perspiration; headache; pains in the loins; eyes injected; tongue coated. Evening: Temp. 103.2° F.; pulse 96; resp. 24; urine acid, not precipitated by boiling.

3d day. Afternoon: Temp. 100.4° F.; pulse 84; resp. 20; urine acid, gives a distinct precipitate on being heated to the boiling point; tongue coated; face less flushed; thirst; anorexia.

4th day. Afternoon: Temp. 99.8° F.; pulse 66; resp. 22; urine not precipitated by heat nor by NO_5; subicteric tint of conjunctivæ; thirst; anorexia.

5th day. Midday: Temp. 99.3° F.; pulse 64; resp. 22; urine turbid, no albumen; appetite returning.

6th day. Afternoon: Temp. 99.8° F.; pulse 64; resp. 22; broth allowed.

7th day. Temp. 99.3° F.; pulse 56; resp. 22; some appetite; conjunctivæ subicteric.

The fact that this person had returned to Havana six days before the attack, together with the long incubation of twenty-two days, leaves a doubt regarding the part that the inoculation may have had in the causation of the disease; but, on the other hand, the small number of yellow fever cases reported at that time in Havana, and the circumstance that newcomers are not often attacked so early as six days after

their arrival in the city, have induced me to include this among my successful inoculations.

From the evidence adduced in the preceding pages, I conclude that while yellow fever is incapable of propagation by its own unaided efforts, it may be artificially communicated by inoculation, and only becomes epidemic when such inoculations can be verified by some external natural agent, such as the mosquito.

The history and etiology of yellow fever exclude from our consideration, as possible agents of transmission, other blood-sucking insects, such as fleas, etc., the habits and geographical distribution of which in no wise agree with the course of that disease: whereas, a careful study of the habits and natural history of the mosquito shows a remarkable agreement with the circumstances that favor or impede the transmission of yellow fever. So far as my information goes, this disease appears incapable of propagation wherever tropical mosquitoes do not or are not likely to exist, ceasing to be epidemic at the same limits of temperature and altitude which are incompatible with the functional activity of those insects; while, on the other hand, it spreads readily wherever they abound. From these considerations, taken in connection with my successful attempts in producing experimental yellow fever by means of the mosquito's sting, it is to be inferred that these insects are the habitual agents of its transmission. It cannot be denied, however, that other such agents may and probably do occasionally occur, but not being endowed with the same facilities for rapid and extensive operation, their influence becomes insignificant as compared with the action of the Cuban culex.

THE LOCAL TREATMENT OF PSEUDO-MEMBRANOUS CROUP: INTUBATION OF THE LARYNX.

By J. Lewis Smith, M.D.,
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Armstrong, in his quaint old book on *Diseases of Children*, reprinted in 1783, and dedicated to Queen Charlotte of England, states that he was often "shocked and mortified" at his want of success in treating hydrocephalus internus, but had he lived in New York during the last twenty-five years, he would soon have learnt to regard the result of his treatment of hydrocephalus internus with stoical indifference, so much more frequently would his sensitive nature have been "shocked and mortified" by his ill success in treating croup, and yet I believe that by bringing to the notice of the profession the solvent power of trypsin, the safety and efficiency of certain of the stronger alkaline solutions,

used by inhalation, by intubation of the larynx and trachea to relieve the dyspnœa, and by the early performance of tracheotomy where other measures fail to give relief, as much has been done in New York, during the last ten years, to relieve the hapless victims of this disease from impending death and death after extreme suffering, as in any other portion of the world.

Alkaline inhalations have been in common use in the treatment of croup, as far back as the recollection of the oldest physicians extends. This treatment is rational, and is based on the clinical fact that alkalies have a solvent effect on fibrin, of which pseudo-membranes largely consist. The vapor arising from slacking lime, or from boiling lime-water, has been so long used that it is associated in the mind with cases of croup. But water takes up only a small quantity of lime, so that, although the room occupied by the patient be filled with its vapor, but little lime is inhaled. The recommendation of late years to increase the alkalinity and, therefore, the efficiency of lime-water by adding to it an alkali, as sodium bicarbonate, has been successfully carried out in practice.

Another agent recently brought to the notice of the profession as a solvent of pseudo-membrane, is the digestive ferment trypsin. Unlike pepsin, which has likewise been employed for the same purpose, it exerts its solvent action in an alkaline medium. For a knowledge of its efficiency as a solvent of pseudo-membranes, we are indebted to chemists, but the attention of New York physicians was first directed to it by Dr. Van Syckel, of Harlem. It is obtained in the shops, prepared by chemists in the form of a powder, insoluble, or but slightly soluble in water, and it is employed for inhalation held in suspension in the medium used. When asked how to treat a case of membranous or diphtheritic croup before it has reached the stage which requires surgical measures, I know no better method than the constant or almost constant inhalation from the steam atomizer of the following:

℞.—Trypsin . . . . . q. s.
Sodii bicarbonat. . . . . ʒij.
Aquæ calcis . . . . . ℥vj.—Misce.

As much trypsin should be added to the alkaline mixture as can be held in suspension without clogging the tubes of the steam atomizer, and it will be found that considerable trypsin may be inhaled in this way in a short time. The only objection to this agent is its expensiveness, so that poor families may sometimes find it difficult to obtain it in sufficient quantity for continuous use during a day or two.

The result in the treatment of croup by inhalation depends to a great extent upon how early it is commenced. In my opinion, croup can not infrequently be prevented by persistent alkaline inhalations employed as soon as the least huskiness of voice is observed. A physician attend-

ing a case of diphtheria should, each day, notice the character of the voice or cry of the child, and if there be the least hoarseness or departure from the normal clearness of its voice or cry, and he recommend the use of alkaline inhalations from the steam atomizer, I believe that the slight laryngeal catarrh which is a forerunner of croup may in a considerable number of instances be removed, and the disease be prevented. I seldom attend a case of diphtheria without observing at each visit the character of the voice, and I frequently make the child cry or cough that I may better learn the condition of the larynx. But if these first slight symptoms pass unheeded, and inhalations be not used at the proper moment, and the pseudo-membrane form upon the laryngo-tracheal surface, we all know how ineffectual inhalations are to check the disease, and save life. Frequently croup occurs at the commencement of diphtheria, and is its earliest and chief manifestation, and the physician is not summoned to the case until the obstruction in the air-passages is fully formed, and the nature of the attack is recognized by the family. Under such circumstances, inhalations will not save life, nor will they do more than perhaps retard in a measure the progress of the disease. One important benefit from inhalation is that it renders the muco-pus thinner and more easily expectorated, the result largely of the watery vapor inhaled, and not entirely of the alkaline solvents employed, although they probably liquefy the thin films of fibrin which are present with the muco-pus.

I must here protest against another mode of treatment, which is designed to act locally, which has been extolled in some of the journals, and which has been practised in this city. I refer to the use of pilocarpine. The theory of those who recommend its employment in diphtheria is that by the abundant secretion from the surface of the air-passages which it causes, it produces detachment of the pseudo-membrane, while it renders the secretion more liquid. But it must be remembered that the expectoration of the bronchial secretion is difficult in membranous croup on account of the obstruction produced by the pseudo-membrane, so that pilocarpine is likely to cause a rapid filling up of the bronchial tubes, an increase of the dyspnœa, and sudden death with symptoms very similar to those produced by suddenly developed œdema of the lungs. I have witnessed this result, the bronchial tubes suddenly filling with the secretion and the patient dying with symptoms of extreme dyspnœa, although a few hours previously he seemed to be in a favorable state.

Much of the success in treating croup by local measures depends upon the apparatus employed. Great assistance has been afforded by the steam atomizer, which without overheating the room, and without the need of a tent to cover the patient and exclude the air, which he so greatly needs, takes the place of the pans and pails and heated bricks

and irons to produce the necessary alkaline vapor, appliances which the older physicians remember that all of us formerly used. The instruments employed in tracheotomy have been so improved, modified, and increased in number since Trousseau brought forward his canula with two concentric tubes, that surgeons possess all that is required to render this operation as far as possible successful. But one of the most important inventions bearing on the local treatment of croup has been recently announced in this city.

The profession of America is indebted to the New York Foundling Asylum, in consequence of the opportunities which this large institution affords, for the differentiation of rötheln from roseola and from measles, and its recognition by us as a distinct disease of a constitutional nature; but a much greater benefit has been conferred by the Asylum, and entirely through the genius and perseverance of Dr. O'Dwyer, in the construction of the laryngeal tubes, and in demonstrating their usefulness in relieving the dyspnœa of croup, in prolonging life, and rescuing from fatal asphyxia a considerable proportion of the cases of croup.

In September, 1858, M. Bouchut, of Paris, read before the Academy of Medicine in that city, a paper entitled "A New Method of Treatment of Croup by Tubage of the Larynx." In this paper the author relates two cases in which he had practised intubation. Both patients were temporarily relieved of the dyspnœa by this operation, but both subsequently died. One lived thirty-six hours with the tube in the larynx, breathing easily during this time, and dying from blood poisoning. The other patient had a return of the dyspnœa some hours after the insertion of the tube, and the house physicians performed tracheotomy without the presence or knowledge of Bouchut, and without disturbing the tube in the larynx, which remained *in situ* forty-eight hours without inconvenience. The tube employed by Bouchut was less than an inch in length, and in the diagram resembles a thimble of small diameter with both ends open. Its upper end when in position lay between the two vocal cords. Bouchut closes his paper with the statement of the following facts, which he believes are established by the above cases. The translation is a free one:

1. The ease with which we can practise tubage of the glottis by means of a canula fastened upon the inferior vocal cords and not hindering the functions of the epiglottis.

2. The tolerance of the canula by the larynx.

3. The possibility of relieving the dyspnœa of croup, and of other diseases of the larynx by this means in preference to tracheotomy.

4. The facility with which large pseudo-membranous concretions formed in the trachea and bronchial tubes are expelled through the intraglottic tube.

5. The utility of this new resource (tubage) for physicians who prac-

tise in small localities without helpers and far from assistance, since little aid is required in introducing the tube.

Unfortunately Bouchut attacked tracheotomy, attempting to show by statistics that the number of deaths from croup is increased by this operation. Trousseau at that time was the great champion of tracheotomy. He had invented his tracheal canula with two concentric cylinders, essentially the same as that in common use. It is natural for one that is struck to strike back, and Trousseau, seeing his pet operation assailed, attacked what he believed to be a new heresy promulgated by Bouchut, with all his power, with statistics, argument, and ridicule. A committee was appointed, with Trousseau at its head, to report on tubage of the larynx for the relief of croup. As might be expected, the committee unqualifiedly condemned tubage and recommended tracheotomy.

The debates which occurred on this subject in the Imperial Academy of Medicine, in which prominent physicians of Paris participated, are interesting at this time. They may be found in the *Gazette des Hôpitaux* for 1858. More than a quarter of a century has elapsed since these debates, and tubage of the larynx had been forgotten as a means of relieving the dyspnœa of croup, until it was revived by Dr. O'Dwyer, although in Bouchut's treatise on *Diseases of Children* one page is devoted to this subject, in which the statistics of seven cases are given, but without a very favorable result.

Intubation of the larynx, as practised by Dr. O'Dwyer, was original with him. He had invented the tubes, and he had performed the operation many times in the New York Foundling Asylum, when his attention was called by the writer to the work of Bouchut in the same direction, and it is only recently that he has seen the report of the memorable debates in the French Academy. He had been four or five years modifying and improving the instruments employed, availing himself of the ample opportunities which the Foundling Asylum afforded for observing the effects of intubation, before this mode of treating croup was announced in the medical press. The tubes of O'Dwyer differ very much from those of Bouchut, and O'Dwyer's last tubes differ very much from those first employed, so many are the alterations he has made in them during the last five years.

Intubation of the larynx has been performed so many times according to O'Dwyer's methed, and his tubes, which extend the whole length of the larynx and trachea to within half an inch of the bifurcation, have been so much improved, that there can be little doubt that this operation will not meet the fate which awaited it when performed and recommended by Bouchut. On the other hand, intubation is destined, I think, to be employed more generally than tracheotomy, both in this country and in Europe, since it is so much more simple. The following facts may be considered established by the statistics of intubation, the

number of cases in which it has been performed for the relief of croup being now quite large:

1st. The tube can be inserted in the fractional part of a minute, and it can be removed in less than a minute. The operation causes little or no pain, and it requires only the assistance of a competent nurse to hold the child and steady its head. Contrast the simplicity of this operation with tracheotomy, which M. Sanné says should not be undertaken without the help of three intelligent and efficient assistants, at least one of whom should be a physician.

2d. In all cases in which the obstruction is limited to the larynx and trachea, intubation relieves the dyspnœa as quickly, effectually, and permanently as does tracheotomy.

3d. When inhalations and the proper medicinal treatment do not relieve croup, and dyspnœa begins, intubation is required. This will, in most instances, give complete relief for a time. If the respiration subsequently become embarrassed, and no benefit occur from cleaning the tube, tracheotomy may be required. Intubation may properly precede tracheotomy in most cases.

4th. Physicians have long known that the mortality from croup might be considerably diminished by the early performance of tracheotomy, and much suffering be prevented, but most parents will not consent to the performance of so severe an operation till the dyspnœa becomes extreme, and measures designed to give relief are urgently required. Not a few parents, in the middle and lower classes, allow their children to die rather than consent to this operation. On the other hand, few parents, I think, will object to intubation, and when they see the relief which it produces they will probably consent more readily to tracheotomy if the dyspnœa should return. If only one of these operations be performed, statistics thus far show nearly as good a result from intubation as from tracheotomy. In the New York Foundling Asylum, during the last year, intubation has been performed in twenty-five cases of membranous croup, with six recoveries. This institution has charge of about 2000 children, three-fourths of whom are "farmed out" in families in the city, and when they contract serious disease they are returned to the Asylum. With such a class of patients it must, I think, be admitted that a better result would not have occurred from tracheotomy.

5th. Now that diphtheria has become so common in this country, and epidemics of it occur in villages and country towns, with, probably, as large a proportion of cases of croup as in the cities, it seems to me, with Bouchut, that the country physician should be provided with the necessary instruments for intubation whenever diphtheria appears in his locality. Alkaline and trypsin inhalations, properly and almost constantly used, and intubation performed early, when the patient begins to suffer from dyspnœa, would probably prevent the necessity of tracheotomy in a

large proportion of instances. But if such treatment do not fully relieve the dypnœa, it will, I think, in most instances, so diminish it and retard the progress of croup, that the physician, remote from help and unfavorably situated for the performance of tracheotomy, will have ample time to prepare for this operation. We repeat, that intubation may prevent the need of tracheotomy, but if it do not, it presents no hindrance to it. We have stated above that in one of Bouchut's cases the house staff, alarmed by the dyspnœa of a patient who was carrying the laryngeal tube, which had probably become obstructed, performed tracheotomy without disturbing the tube. The longer tube of O'Dwyer might, perhaps, serve as a guide in tracheotomy, but it can be quickly removed, if thought best, before the operation is commenced.

ABNORMAL VISUAL SENSATIONS.

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With increasing knowledge and improved methods of diagnosis, most of the cases formerly classed as amaurosis or amblyopia are now relegated to their proper position in the list of more definite diseases of the eye; but meanwhile slight errors of vision, which were formerly unheeded, have been brought into notice, some of them only within the last year or two. Amblyopia thus continues to be a generic term, including all cases of dull sight in which no distinct lesion of the eye can be discovered; it expresses, in a general way, the failure in function without indicating the pathological condition present. Subdivisions have been made according to the assumed cause of the affection; the assumption in some cases is supported by the strongest possible evidence, as in tobacco amblyopia; while, as more light is thrown upon the subject, the term hysterical amblyopia becomes less frequently used.

The essential symptom is a partial or complete absence of perception, either of objects or colors, in some part of the visual field; the function is impaired or modified. A normal visual acuity varies with illumination; it is certain, therefore, that some amblyopias will be much modified by the amount of light.

It is convenient to classify the cases according to the part of the visual field which is chiefly affected; but at the same time the evidence that has been derived from the pathological conditions present in those examined indicates that the position of the lesion is fairly constant for similar conditions of the visual field. In some a well-defined organic mischief

has been shown to be present, either in the peripheral nerve terminating in the retina, in the cerebral centres, or in the optic fibres connecting these; in others a definite cause exists for initial vascular disturbance of the nervous elements of the retina.

The main affection of the visual field may be at the periphery, at the centre, or in one half: "concentric amblyopia," "central amblyopia," "hemiopia."

1. *Concentric limitation of the field of vision* exists whenever the general function of the retina is impaired; for instance, after "injury;" in "retinitis pigmentosa," where the effect of dull light is very marked (other forms of retinitis are complicated by hemorrhage); and in increased "eyeball tension."

In "reflex amblyopia" (Priestley Smith, *Ophthal. Rev.*, 1884), where some distinct irritation of sensory nerves affects the retinal circulation, it is the circumference of the field that is most blurred in many cases. The removal of the uterine appendages by abdominal section effected the recovery of useful sight in an eye which, up to the very day of operation, was increasingly threatened with blindness; the withdrawal of a tooth is said to have restored sight to an eye formerly blind; and a similar cure has followed free purgation. The retinal fatigue which accompanies general nervous weakness ("neurasthenic asthenopia," Wilbrand), whether expressed by anæsthesia or hyperæsthesia, is best marked at the limits of the field, as is the case also with "hysterical amblyopia," which is almost always either neurasthenic or reflex.

The concentric limitation of the field depends on functional weakness of the periphery of the retina, due to failure in its circulation; no definite abnormal appearance of the fundus oculi can be seen, although hyperæmia or slight œdema may have been described. Marked retinal asthenopia may be present without any appreciable alteration in the disk or in the retinal bloodvessels; but it must be remembered that the rods and cones derive their blood from the "chorio-capillaris," whilst the "arteria centralis retinæ" supplies the less vital fibres and large cells. Moreover, the chorio-capillaris which lies upon the hexagonal pigment cells has its network closest and richest for blood supply at the yellow spot, whilst it becomes gradually more open toward the ora serrata. The anterior parts of the outer more active retinal layers would thus be earliest affected by any conditions producing vascular depression.

Concentric amblyopia depends probably, therefore, upon malnutrition of the bacillary layers of the retina by failure of the circulation in the chorio-capillaris.

The circulation in each eye is separate entirely from that of its fellow; each has its own special sympathetic control. The importance of the circulation through the arteria centralis retinæ must not be underrated, for its blockage is followed by complete blindness in the affected eye,

while occlusion of one of its branches destroys the function of that segment of the retina to which it is supplied.

2. *Hemiopia* in one eye may thus result, the line of separation being usually horizontal. Interstitial inflammation of a part of one optic nerve may cause a like segmental defect. A medical friend has complete scotoma in the lower field of the left eye; the central vision presbyopic is J. 16 and $\frac{20}{XLV}$ compared to $\frac{20}{XXXV}$ and J. 16 in right; no retinal abnormity can be detected by the ophthalmoscope; the retinal blood-vessels are everywhere normal; but the whole optic disk is distinctly white.

Hemiopia is usually binocular, and depends on intracranial lesion, and conversely intracranial mischief of the optic tract or centres produces binocular hemiopia; for, by reason of the symmetrical binocular arrangement of the nerve system of the eyes, *each side of the brain is represented on that same side in both eyes.* A right cerebral lesion causes impairment of the right half of each retina, with amblyopia in the left field. Samuelsohn has described a case of binocular hemiachromatopsia, the other eye symptoms being normal, in a patient with hemiplegia from apoplexy; Swanzy a somewhat similar case. Conversely, *each eye is represented in both sides of the brain.* In hemiopia, central vision is frequently normal; each macula is supplied by both optic tracts. This anatomical arrangement may explain cases of monocular diplopia; in most of those recorded, cerebral lesions have been found after death. Dr. Abercrombie has suggested that the impressions transmitted from the single retina to its two sides in the brain are interfered with by the presence of the lesion; and the two hemispheres not acting in perfect unison, a concept is created of two separate impressions. Where monocular homonymous diplopia has followed after ordinary binocular homonymous diplopia from paralysis of an external rectus, Nettleship thinks that the diplopia of each separate eye may be a mental reproduction of the diplopia experienced by the distorted pair. When both eyes are affected with monocular diplopia, there is usually a great similarity in the relative position of the images as seen by each separate eye. Sometimes the position of the images is such as to suggest an absolutely symmetrical affection of the retina in each eye. Monocular diplopia may affect one eye only, or may exist in only the outer field of one eye (Brailey). A converse condition of things has lately been described by Wolffberg, viz., a blending of two separate but similar objects lying close together into one image, whether looked at with the two eyes or with one singly. The position of the lost image was not recognized as a defect in the visual field. The pathological cause of this illusion is not suggested; possibly some of the retinal nerve endings are not properly represented in the higher visual centres.

3. While hemiopia depends usually upon some disease on the cerebral side of the optic chiasma, central amblyopia may be generally associated with a lesion in the optic nerve or in its retinal expansion. A well-marked central scotoma may be present, or only a very slight error of the color sense. The detection of the slighter defects depends on the care and capacity of the observer; and, while one may explain the symptom by describing a diffused grayness, an œdema, or small white specks in the macula, another may entirely fail to find anything wrong. Tiny hemorrhages may be overlooked. When they exist at the papilla, they are suggestive of a similar condition deeper in the nerve. In typical cases it is admitted that ophthalmological evidence of changes in the fundus are absent. In many a toxic causation is fairly assumed. Tobacco, alcohol, bisulphide of carbon, lead, quinine, have all been admitted as causes, in addition to kidney disease and diabetes.

I have under treatment a man of forty, with typical tobacco amblyopia, who has been a teetotaller for twenty years. Most excessive smokers also drink, perhaps not to excess. The efficacy of alcohol in preventing tobacco blindness may be questioned, but it is easier to induce the patient to abandon tobacco if a little stimulant is still permitted. I have seen one or two cases of dull central green perception in women which I have attributed to alcohol. A gentleman of forty, who had suffered from albuminuria for some years, but without any other evidence of disease, consulted me for failure of sight. Central vision was reduced one-half; there was a well-marked red scotoma and a total absence of green perception under several tests. The fundus of the eye showed no albuminuric signs; nothing but some pallor of the disk. The patient smoked and drank liberally, but not to great excess; at the same time he slept badly and ate little. Reduction of both smoke and drink soon markedly improved his condition, but I do not know whether the eyesight has recovered.

Post-mortem examination of patients who had central amblyopia has shown that a neuritis with marked interstitial inflammatory changes existed in the axial fibres of the optic nerve. In some of them the brain lesion lay opposite the optic foramen, where the nerve is constantly subjected to pressure against the bone and by the ophthalmic artery. The bloodvessels of the nerve, quite distinct from the retinal and choroidal arteries, pass in at the surface of the nerve and become more and more divided as they approach its central fibres. The finest capillary plexuses which have the highest functional activity, and are therefore specially prone to inflammation and pathological changes, are distributed to the central axial fibres which are the most highly vital, and pass into the macula lutea. Thus the part of the optic nerve which is concerned in central vision is specially liable to hyperplasia and sclerosis.

Central scotoma is well known as a result of gazing at the sun; in

extreme cases the ophthalmoscope may show a small white spot at the centre of the macula, surrounded by a red ring. Near exposure of the eye to a strong electric light produces impairment of the retina, followed in a few hours by inflammation of the eyes; snow blindness is accompanied by similar symptoms. Excessive stimulation of the retina is more diffuse, in the latter cases implicating the whole membrane; in the first the macula is mainly affected.

Well-defined structural changes have been found in the eyes of rabbits which have been exposed to excessive sunlight; microscopic examination showed disorganization of a limited area of the retina by coagulation of its albumen, and beneath and around this hyperæmia and exudation in the choroid. The ophthalmoscopic appearances in man are such as might be dependent on the like histological changes in the macula. Inflammation of the yellow spot with swelling and separation of the retinal elements may be a cause of micropsia; a diminished number of the cones, and these the more central, are overshadowed by the retinal image, and the contracted area of the stimulation produces a relatively limited mental impression. Diminution in the apparent size of an object has been also explained by Bensen in a case of ophthalmoplegia interna, as dependent upon the extra muscular strain needed by a weakened ciliaris, this giving an idea of undue approximation of the object, and so of its relative diminution in size.

Metamorphopsia probably results from an altered relation of the macular elements. Straight lines seem bent and crooked; part of an object is too small, part too large (megalopsia); separate objects in the visual field may be perfect, but their relations to one another contorted and untrue. The letters of a word may be seen in front of and some behind the level of the paper on which they are printed.

In these complicated visual errors it is impossible to say what part the mind plays, or how much they are dependent upon the condition of the eye.

Visual hallucinations, properly so-called, which are purely dreams of the imagination, dependent on abnormal conditions of the highest physiological cerebral centres, subjective in themselves, and not dependent upon stimulation or alteration of their afferent nerve tracts, are probably extremely rare during hours of wakefulness. Such a case is described in the appendix to *Huxley's Physiology*. The dreams of sleep usually are excited by some external stimulus. An illusion or modified sensation may depend upon exhaustion or mischief in the central organ, or may arise from perversion of the stimulus received upon a faulty peripheral sense organ.

The brain is affected in such a case as that of the Hon. Mr. Perceval, who mentions that, on the commencement of his insanity, while looking at a boiled fowl which was prepared for his dinner, it appeared very

large and plump, then it suddenly became small and meagre, and afterward of twice its former size. So, in watching a fellow patient, who was one day walking in the airing ground, he observed at one part of the walk that this man suddenly changed in shape, and walked into the house under the form of a demon. The illusion from the same object is, therefore, not always fixed and permanent, but subject to momentary changes.

Two cases have come under my observation in which seeing imaginary faces in the day has been associated with retinal disease, and it is possible that in them the diseased sense organ may be largely answerable for the illusory appearances.

CASE I.—Miss M., aged fifty-five, consulted me for asthenopia: "objects seem strange and distorted, faces are looking at me on opening my eyes after having closed them for relief or sleep." She had always been short-sighted. Had a slight seizure three years before of both hands, with transient difficulty in choice of words. For two years both eyes had regularly seen a blaze of gold light on the street lamps surrounded by halos of green, red, and purple. Sight had been dull also, the electric light not seeming to her specially bright.

Vision of left eye $\frac{5}{xxx}$ J. 8. Fundus apparently healthy as seen through cataractous lens. The right eye was also cataractous, but the fundus could be indistinctly seen. The nerve seemed normal, its vessels were of fair size, it was pale, tending to be cupped, and surrounded by a narrow posterior staphyloma. There was a distinct patch of thin retinitis at the macula, with fine specks of pigment on the retinal vessels. There were also one or two floating specks in the vitreous. Tension was normal, and no indications bore examination in favor of glaucoma.

The right eye was alone affected by seeing—upon opening and closing—faces looking at her of squirrels, owls, and less clearly of men, never two alike, and never suggesting known characters. This symptom had existed for some months, and disappeared during sleep and with closed right eye. She described metamorphopsia, but it was absent at my examination.

CASE II.—Mrs. S., aged seventy, complained of scintillations of light, and of having seen more or less constantly for several months large faces on the wall. The faces were generally in profile, bearing some resemblance to one another, rarely to be recognized, but occasionally suggestive of some known person. The faces were present at all times of the day when her eyes turned toward the wall. Vision was reduced to barely J. 20 by large patches of choroido-retinitis with atrophy, the disks were pale, and the vessels small. The media were perfectly healthy. Despite the failure of vision Mrs. S. wrote quite legibly. There was nothing in the past history throwing light upon the case. Both these ladies were sensible, and used every suggestion given to rid them of the illusion, but I obtained no satisfactory result from a short course of treatment in either case.

An interesting series of symptoms in fatigue of the visual nervous system is reported by Richard Hilbert (*Klin. Monats. f. Augenheilk.*, 1884):

"(1) After a sleepless night H. found that, on looking at a white surface, the field of vision was subject to alternate flashes of light and obscurations synchronous with the pulse beat. (2) On looking at print the letters seemed some in front and some behind the paper; paving stones appeared on a different level in the street. (3) The interspaces between the paving stones appeared red. This condition of *erythropsia* occurred with various degrees and directions of light; it was present with one or both eyes open, with closed eyes it was never perceptible."

The symptoms were considered due to general nervous exhaustion, with hyperæsthesia of the visual nervous system in the brain; and reasons are adduced for preferring this central hypothesis in erythropsia, rather than explaining it by retinal fatigue; but the latter cause seems at least equally probable. No abnormal condition of the eyes could be detected during the attack; with the exception of slight myopia, they were objectively normal.

Chromophobia is a term applied to cases of special hyperæsthesia in which some particular color causes intense worry to the patient, who may, for instance, be made miserable by seeing a piece of red blotting-paper.

Whatever may be the relative bearing of the peripheral sense organ, or of the central sense organ, in a given case of impairment or illusion of vision, the optic nerve itself when stimulated merely gives rise to a sensation of light. Sensations of light are well known to be excited independently of ordinary impressions from external luminous objects; some are altogether the result of disease in the optic apparatus. The word *photopsia* best expresses this subjective feeling of "visus lucidus."

Case III.—A lady, aged forty-six consulted me on account of most severe attacks of light *glare*. The left eye had been removed twelve years before for recurrent attacks of inflammatory glaucoma. The right eye then began to give trouble; an iridectomy was done eight years ago with a good result; a second operation was required two years later; and a year after this very little vision remained. The "glares" first began in April, 1885; they have continued to cause her the greatest worry and inconvenience on every other day, almost without intermission up to the present time. In July, 1885, there was perception of candle light. The patient says that she feels in the morning that the glare is coming on; about noon a sheet of light gradually spreads in front of her as if the outer world had become bright, and continues with little variation in intensity all day; if she falls asleep, as she often does, the attack is gone on waking, but it gradually reaches its former intensity. It usually gets rather worse toward dusk, and she wonders why people want lamps. The attacks recur every second day, the sight then seems very bright in contrast with other days when it seems dull; no objects are ever seen, but slight dazzlings occur, with green, red, and purple colors.

When I saw her first in April, 1886, I found the right eye shrunken, with much diminished tension, and subacute hyperæmia of the tunics. The cornea, entirely replaced, except at the periphery, by a thick sclerosis in which the iris seemed implicated, was flattened, and no anterior chamber existed. Perception of light was entirely gone. The glare was dis-

tinctly referred to this eye, which became weak and red during the attack. She has led an active life, but for years has been liable to attacks of slight weakness of the left side, lasting only a few minutes, which are induced by slight sudden shocks. Her heart was easily upset. There had never been any indication of migraine, no frontal headache, hemicrania, nausea, or sickness, nor were there any special symptoms before or after the attacks of "eye-glare." These had first commenced long after the age usual for migraine, in which also the scintillating scotoma usually lasts for only an hour or so. The hemiplegic attacks mentioned had been definitely called hysterical; the patient was certainly hyperæsthetic. There was no definite pain in the eye.

The continuous character of the glare is more in accordance with a continuous irritation of the optic nerve producing a condition at the cerebral cortex which culminated in the mental impression complained of, than that it was primarily due to blood changes in the central organ, or nerve discharges from it, which would cause more inconstant and transient light seizures.

Charpentier (*Archives d' Ophthalmologie*) remarks, as the result of experiments, that the sensation of light is produced by the excitation of other elements than those set in action when distinct vision or the sensation of color is elicited.

The light sense is pretty equally distributed throughout the visual field, and possibly depends on the evenly arranged hexagonal pigment cells.

In the case mentioned, the glare had commenced about the time the eye was distinctly degenerating, and also when the patient (who at this time had only bare knowledge of the position of light) was becoming hopeless as to return of sight.

The "longing to see" might have influenced her over-sensitive brain to be unduly active to the subjective impressions received from the hexagonal cells, or whatever may be the physical basis for the light sense, within her irritated and disorganizing eyeball.

Under treatment directed to the patient's general health, improvement is beginning to be felt, but the "glare" still comes on every second day, although in distinctly less amount, sometimes scarcely at all, as I gather from letters. I attribute the photopsia to the condition of the eye, because the eye is always more hyperæmic and damp during the attack; it only then feels distinctly "weak" to the patient—she herself refers the conditions solely to the eye; and lastly because cocaine has given such marked relief that she always keeps it close to her on "glare days" so as frequently to apply it.

The misery caused by the glare was such that, had no improvement followed general treatment, the patient would have submitted to removal of her only eye if she could have been reasonably assured that this would give a fair prospect of relief.

THE SURGERY OF THE PANCREAS, AS BASED UPON EXPERIMENTS AND CLINICAL RESEARCHES.[1]

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(Continued from page 165.)

Wounds of the Pancreas.

Of all abdominal organs the pancreas is most exempt from injury, both from direct and indirect violence, a circumstance which is entirely due to its remote location, and the ample protection furnished by the vertebral column and the bony walls of the chest. The anatomical relations of the pancreas to numerous and important organs are such that when this organ is injured the same violence which has produced the injury has also wounded an adjacent and perhaps more important viscus. The frequency with which such grave complications attend wounds of the pancreas, and the profuse hemorrhage which usually attends such injury, are elements of danger which impart to wounds of the pancreas more than an ordinary degree of gravity.

Contusion.

Case I.—Cooper (*Lancet*, Dec. 31, 1839, vol. i. p. 486) reports the case of a man, aged thirty-three years, run over by a light cart, moving with great speed. No marks of external injury were visible, but the lower left ribs were fractured, and the pancreas was literally smashed, and embedded in semi-coagulated blood. The spleen and left kidney were also ruptured. He died a few days after the accident.

Case II.—Travers (*Lancet*, 1827, vol. xii. p. 384) observed a case of laceration of the pancreas at St. Thomas's Hospital. An intoxicated woman was knocked down by the wheel of a stage-coach, which, however, did not pass over her. She lived only a few hours. Several ribs were fractured; the pancreas was found completely torn through transversely, the liver was lacerated, and much blood was effused.

Case III.—Störck (*Annus Medicus*, 1836, p. 244) mentions the case of a woman who was run over by a coach, and who died within a few hours. The pancreas was found completely torn in two, and embedded in a large mass of semifluid blood. Several ribs were fractured, and the liver was also ruptured.

Case IV.—M. Le Gros Clark (*Lect. on Princ. Surg. Diag.*, 1870, p. 298) observed an instance of subcutaneous laceration of the pancreas, which occurred in a lad who was also the subject of other severe injuries that speedily proved fatal.

Penetrating Wound of Abdomen, with Protrusion of Pancreas.

Case V.—Laborderie (*Gazette des Hôpitaux*, 1856, No. 2) reports the case of a girl, aged ten years, who had fallen, while running, upon an open pocket-knife, which inflicted a wound two centimetres below the lower border of the

[1] Read before the American Surgical Association, Washington, D. C., April 29, 1886.

rib, and three fingers' breadth to the right of the median line, extending outward for one and a half centimetres, almost horizontal, with a little inclination from above downward. The pancreas was found strangulated in the wound so tightly that not a drop of blood escaped. The author believed that the prolapse was caused by the screaming of the patient. The duct of Wirsung and vessels escaped injury. The abdomen was painless on palpation, and there were no signs of internal hemorrhage. The knife had entered the abdomen under the lobus Spigelii of the liver, and in its course reached the stomach, cut through the gastrohepatic omentum, and then penetrated between the liver and pylorus to the pancreas, without injuring any of the many large vessels in the locality through which it passed. An attempt to replace the gland was only partially successful. The mass was transfixed and tied at its base with a double ligature, and the portion outside of the ligature removed with the knife. After this procedure nausea and vomiting set in, which, however, soon subsided. The wound was treated by the use of cold water applications. On the third day the patient complained of being chilly, and the abdomen became somewhat tympanitic and tender on pressure. These symptoms soon subsided, and the ligatures sloughed through, leaving a granulating surface, which healed in fourteen days. Recovery was complete in three weeks.

Hyrtl and Klebs are incredulous as to the prolapse of the pancreas in this case; they believe that the mass which was ligated and removed was not the gland, but a portion of the omentum. Nussbaum (*Die Verletzungen des Unterleibes*, 1880), however, in speaking of visceral injuries of the pancreas, states distinctly that in penetrating wounds of the abdomen in the region of the pancreas, this organ manifests a tendency to prolapse, and that this circumstance facilitates the treatment, as it protects the peritoneal cavity against infection by plugging the wound, and at the same time affords better access to the bleeding vessels.

Case VI.—Dargau (*Medical and Surgical Reporter*, Aug. 22, 1874) saw a case in which the pancreas protruded through a wound five inches in length, between the last two false ribs, on the left side. The patient was a negro, who had been injured fourteen hours before he came under treatment. The pancreas was replaced, the wound closed, and the patient made a good recovery.

Case VII.—Caldwell (*Transylvania Journal of Medicine*, 1828, vol. i. p. 116) reports the following remarkable case. In 1816, a negro was stabbed in the left side, and "an oblong body, between three and four inches in length, was observed to have protruded." Drs. Roberts, Heard, and Caldwell supposed the protruded part might be mesentery, omentum, or lung substance; but, on a more minute examination, that opinion was changed to the belief that it was the small extremity of the pancreas. The protruding part was in a gangrenous condition, and was removed with the knife. The patient soon recovered. The gentlemen who treated the case, "thinking it almost impossible that the pancreas could escape through a part of the diaphragm and between the ribs," made a critical examination of the part removed, which resulted in their *thorough conviction* that the tissue removed was a portion of the pancreas.

Case VIII.—Kleberg, who, together with Dr. Wagner, Jr., examined the specimen of pancreas microscopically at the time, reports in Langenbeck's *Archiv für Chirurgie*, vol. ix. p. 523, the following case:

A. S., æt. sixty, a discharged soldier, of powerful frame, and a drinker, was surprised while burglarizing, and cut in the abdomen with a knife from below upward while stooping over. He was carried into the surgical wards of the hospital at 6 A. M., having a cut in the abdomen running horizontally between the navel and lower border of the ribs on the right side. Protruding from the wound was a brown-red body about three inches long by two inches in width, of a doughy consistence and covered by a smooth membrane. Imme-

diately after entering the hospital he had a normal passage through the bowels; pulse 72; no pain. The stomach, intestines, and liver could be excluded on examining the appearance and physical properties of the projecting body. There was no fat, as would have been the case had it been the omentum of such a corpulent person. The prolapsed body was compact and homogeneous, could not be separated into layers, and presented no dilated vessels. It was, therefore, taken to be the head of the pancreas.

As reposition of the protruding part did not appear advisable on account of a possible constriction, and as the consequences could not be foreseen, the part was fixed in the wound with two Karlsbad needles, which were passed through the sides of the wound and the protruding part; a silk ligature was then passed around the pedicle of the protruding part and the end cut off with one stroke of the knife; the profuse oozing of blood was stopped by tightening the ligature. The stump was touched with liq. ferri sesquichlor., and cold applications made over the whole abdomen. There was no fever, peritonitis, or disturbance of digestion in the course of the recovery. The needles and sutures were removed on the fourth day; the stump had become adherent to the edges of the wound. The stump and ligature came away on the tenth day. The patient left the hospital twenty days after admission, with a three-cornered depressed scar. As he was perfectly well nourished during the entire time, it is probable that the caudal extremity of the gland was removed and that the portion of the gland remaining, with the excretory duct, performed the function of the gland adequately.

The following two cases are from the *Medical and Surgical History of the War of the Rebellion*, Part II. Vol. II., Surgical History, p. 158.

CASE IX.—Assistant Surgeon J. G. Thompson, 77th New York, reports the case of "a soldier, name unknown, who was wounded at Cedar Creek, October 19, 1864. The ball entered the right side, below the ribs, and emerged on the left side. He was removed to the Taylor Hospital, at Winchester. While straining at stool, two days subsequently, a hernia of the pancreas occurred of the size of a hen's egg. A silver wire was passed about the pedicle by which it was attached, and twisted tighter each day for about a week, until it became very small, and was snipped off with scissors. No especial symptoms supervened, and by the last of November the patient was in a fair way toward recovery and was moving about the hospital. In December he was still doing well."

CASE X.—Private William Freshwater, Co. F., 66th Ohio, received wounds of the abdomen, left forearm, and neck, at Port Republic, June 9, 1862. He was conveyed to Front Royal, arriving on the 13th, and on the 14th was sent by rail to Washington, and admitted, on the 15th, to Judiciary Square Hospital. He was placed in a ward under the charge of Acting Surgeon D. W. Cheever, who states that "a ball had entered one and a half inches outside the left nipple, on a level with the seventh rib, and could be felt under the skin near the spinous process of the left dorsal vertebra. Some viscus, thought to be the lower tip of the lung, protruded at the wound. He died in two days (June 17th) with symptoms of peritonitis. Post-mortem: The ball had pierced the diaphragm without touching the lower lobe of the lung; there was no perforation of the intestines, but they were glued together by peritoneal inflammation. The pancreas protruded at the wound."

Gunshot Wounds.

The only cases of gunshot wounds of the pancreas that I have been able to find are reported by Otis (*Ibid.*, p. 159).

CASE XI.—Private J. Koprieau, Co. B., 51st New York, aged thirty-two years, was severely wounded at the battle of the Wilderness, May 5, 1864, and was at once taken to the field hospital of the 2d division, Ninth Corps. As the patient could not talk English, the history of the case is quite imperfect.

Assistant Surgeon J. C. McKer furnished the following description, which I have abbreviated without omitting essential facts. The patient came under his care May 25, 1864, when it was ascertained that he was suffering from a gunshot wound of the back, the ball entering about six inches to the left of the spinal column, having pushed below the eighth or ninth rib. It was evident that the ball had entered the abdominal cavity, but its course could not be ascertained. Patient's general health was apparently good, and he seemed to suffer but little pain from the injury. Appetite good, bowels regular, urine slightly suppressed and somewhat highly colored. Pulse normally full, but slightly irritable. The patient was ordered quinine, whiskey, nourishing diet, and two doses of acetate of potassa. No noticeable change appeared for about one week, when a severe hemorrhage occurred, apparently venous, from the external wound, which was soon arrested by the use of compresses and styptics. About six hours afterward a quantity of urine was voided, which was thickly mixed with blood. These hemorrhages continued to recur two, three, and four times daily till death, the urinal discharge being very frequent, and always bloody. Death resulted June 5, 1864. Post-mortem examination revealed the following: A Minie-ball had entered at the middle portion of the eighth rib, fracturing the same, passed through the centre of the spleen toward the pancreas, penetrating this also in a nearly transverse direction, and (probably a few days before death) sinking toward the splenic artery, tore it, and lodged at its origin from the cœliac axis; the lung was found emphysematous. The ball was found embedded in the pancreas in a pouch between the sloughing artery and vein. The specimen is preserved as a wet preparation in the Army Medical Museum, and is marked No. 2430.

Case XII.—Corporal A. B. Jones, Co. D., 5th Vermont, aged twenty-seven years, was wounded at the battle of the Wilderness, May 10, 1864, and laid on the battlefield one day and night; was then removed to the field hospital, from there carried by boat to Washington and jolted over a rough road of two miles to the Lincoln Hospital, which he reached about two o'clock in the morning of the 25th. Was seen a few hours afterward by Acting Assistant Surgeon, T. L. Leavitt, who found him suffering great agony. On examination it was found that the ball had entered one line to the left and below the ensiform cartilage, passing through the abdominal cavity and making its appearance under the skin just above the crest of the ilium posteriorly, where it was excised at the field hospital. Pulse quick and exceedingly feeble, abdomen distended and tympanitic. Opium was administered and the patient took liquid food freely. About noon of the same day the symptoms improved, wound suppurating nicely. About four o'clock was conversing with nurse, apparently in good spirits, without very great pain; in about five minutes afterward was *in articulo mortis*. The autopsy showed the ball to have perforated the inferior curvature of the stomach, and, strange as it may seem, although an orifice was made directly through the walls of the stomach large enough readily to admit two fingers, no inflammation or even congestion could be detected, except in the immediate locality of the wound, which was beginning to suppurate. Evidently the stomach was also uninjured in its functional capacity, as was witnessed by the reception and digestion of food during life. Some branches of the gastric artery were severed, and about an ounce and a half of dark uncoagulated blood filled the pelvic cavity. The pancreas was perforated at about its middle, but, except in the immediate track of the ball, gave evidence of no departure from its healthy standard; the intestine and colon were pushed aside during the passage of the ball and were uninjured; the omentum was found in a state of partial decomposition and closely adhered to the small intestine. Liver and spleen healthy. General peritonitis had prevailed and was undoubtedly the cause of death. In this case life was sustained for a period of fifteen days, notwithstanding the serious injury of a vital organ and the exposure to the most unfavorable circumstances and depressing influences.

Case XIII.—Private William P. B., Co. A., 44th Georgia, was wounded, near Fort Stevens, in General Early's demonstration on Washington, July 12, 1864, by a cylindrico-conical musket-ball, which entered below the spine of

the left scapula, an inch from the shoulder-joint, and penetrated the chest. He remained a prisoner on the field, and was conveyed to Lincoln Hospital, a few miles distant, being admitted on July 14th. He was examined by Dr. Leavitt, who found that emphysema extended over the entire left chest, that respiration was painful, but not otherwise difficult, and that there was paralysis of motion of the left arm. There was little change in the progress of the case until the 18th, when the pain in the side became severe, and was somewhat relieved by sinapisms. Following day, dulness over posterior left chest, also extreme dulness in the præcordial region and the heart was forced over to the right side. There was dulness too at the base of the right lung, with indistinct respiratory murmur. On the 20th, jaundice was very pronounced. On the 21st, profuse hemorrhage from the nose and mouth occurred, bleeding coming apparently from the lung. Pulse at this time very weak and thready; jaundice extreme. On the 22d there was much pain in the left side, dyspnœa, consciousness perfect, pulse failing; death at noon, July 24, 1864, twelve days after the injury. At the autopsy the wound was traced from the entrance in the scapula through the fractured fifth rib, the track passing downward, inward, and backward, through the lower lobe of the left lung, the diaphragm, the left lobe of the liver to the head of the pancreas, where the ball was found lodged at the angle formed by the cœliac axis with the aorta. The lower lobe of the right lung was hepatized; the left lung carnified, collapsed, and compressed by a large accumulation of black fluid blood. The pancreas was rather large—seven inches long; weight, with ball, five ounces. There was nothing abnormal in its appearance, except the presence of the foreign body. On examining the pancreas mircoscopically no deviation from the normal structure was found in sections made from the tissue taken from the left end or tail of the viscus and from the middle part. In close contiguity to the ball is a fine network of fibrillated tissue. As hardened in alcohol the specimen offers no indications of vascular engorgement having existed. The specimen is preserved in the Army Medical Museum, and is marked No. 2884.

Remarks.—Not in a single instance of the thirteen cases of injury of the pancreas, as reported above, did symptoms during life first point to this organ as the seat of lesion. In all cases where the result was fatal, death was not attributable to the visceral lesion of the pancreas, but was always referable to injury of some adjacent organ. With the exception of cases of prolapse of this organ through a penetrating wound of the abdomen, the diagnosis and treatment of injuries of the pancreas will come under the observation of surgeons only in an incidental manner in the treatment of more tangible and graver lesions within the abdominal cavity. Contusion and laceration of the pancreas as an independent condition is not necessarily a fatal injury, and spontaneous recovery may take place followed by absorption of the crushed portion of the organ, and atrophy of that portion of the gland which has become physiologically detached from the intestinal tract by the injury or its direct consequences. Crushing of the pancreas is usually not attended by hemorrhage, and in laceration of the organ the danger from this source is much less than in cases of incised wounds.

As modern surgery dictates not only the justifiability but the absolute necessity of treating penetrating wounds of the abdomen, where visceral injury is suspected, by abdominal section, the surgery of the future will undoubtedly deal with contusions and lacerations of the pancreas in con-

nection with visceral injury of some of its adjacent organs. If, in exploring for injuries in this region, the pancreas should be found extensively crushed, it would be good surgery to remove the crushed portion after preliminary ligation of the organ on each side of the comminuted portion. Ligation of the pancreas can be safely done with a single catgut or silk ligature, as the friable texture of the organ will permit of burying the ligature deeply, a circumstance which will guard against slipping of the ligature. In not a single instance where this method of ligation was resorted to in the experiments on animals, was secondary hemorrhage observed from inefficiency of the ligature. If the pancreas is lacerated, each end of the organ should be ligated for the purpose of arresting or preventing hemorrhage, as well as to guard against extravasation of pancreatic juice into the abdominal cavity.

The results obtained by experiments on animals, as detailed before, have demonstrated in a satisfactory manner that normal pancreatic juice when brought in contact with the peritoneum does not produce inflammation, but is promptly removed by absorption. In the experimental work we always had the advantage of dealing with a normal serous surface, the absorption capacity of which had not been impaired by antecedent pathological conditions, as would in all probability be the case in the operative treatment of injuries of the pancreas. At the same time there can be no doubt that the presence of crushed pancreatic tissue and pancreatic juice in the peritoneal cavity, after abdominal section, would greatly enhance the danger of traumatic infection. For this reason, if for no other, the former should be removed and the escape of the latter prevented by ligation of the pancreas on the side, or each side, of the crushed or lacerated portion.

The cases of protrusion of the pancreas seem to establish the fact that a portion of this viscus may be separated by violence from the splenic artery and other important attachments, and may prolapse through an external wound, and under such circumstances can be removed without hazardous consequences. In most cases the prolapse followed some time after the injury from a sudden increase of intra-abdominal pressure, as coughing or straining at stool. Klebs and Hyrtl's objection to the possibility of a hernia of the pancreas, can find a plausible support only by assuming that the relations of the pancreas have not been disturbed. If, by the violence which produced the penetrating wound, the attachments of the organ are severed, or in case the attachments have been abnormally loose, or the duodenum is supplied with a long mesentery, there is no tenable reason why the pancreas should not occasionally be found protruding through the external wound. Cases are on record where the pancreas constituted one of the contents of a diaphragmatic hernia, and an instance is reported where it formed a part of the intussusceptum in a case of invagination of the bowel (Bandl).

The treatment of prolapse of the pancreas will depend upon the pathological condition of the viscus at the time the patient comes under the care of the surgeon. If the prolapse is recent and the organ presents no indication of inflammatory or other changes, it should be thoroughly disinfected and replaced. It is of the greatest importance not to resort to violence in effecting reduction, as irreparable damage may be inflicted by resorting to more than the gentlest force. When reduction is not readily accomplished, the wound should be enlarged. If the pancreas is in a condition of inflammation or gangrene, the parts should be thoroughly disinfected and the organ pulled further into the wound until healthy tissue is reached, when a ligature is applied and the diseased portion removed with the knife or scissors. After another thorough disinfection the stump is dropped into the abdominal cavity and the external wound closed. Thorough primary removal of infected tissue is the only safety against subsequent extension of the infection to the peritoneal cavity, and the only guarantee for primary union of the abdominal wound.

In gunshot wounds of the pancreas we have no guiding symptoms upon which to base even a probable diagnosis. The point of entrance and exit of the ball, and its probable course, are the only facts which may point to the pancreas as one of the injured organs. In four of the five cases the projectile penetrated posteriorly in the space between the angle of the left scapula and the angles of the ribs, and passed through the diaphragm and the solar plexus; in one, the ball entered anteriorly near the tip of the xiphoid cartilage, and was believed to have passed through the stomach.

It is a notable and somewhat significant fact, that in all cases where life was prolonged for more than twelve days, the pancreas appeared to have undergone but little or no pathological change in the vicinity of the visceral wound. Although in all cases the track of the ball did not remain aseptic, the inflammatory changes did not materially affect the parenchyma of the gland.

In Case XIII. the formation of a capsule around the bullet had already been initiated, and if the patient had lived there is every reason to believe that the foreign body would have become encysted in the parenchyma of the pancreas. Gunshot injuries of the pancreas, when they come under the observation of the surgeon as an independent lesion, or as a complication of other visceral injuries in cases of penetrating wounds of the abdomen treated by laparotomy, should be treated in the same way as a contusion or laceration of the gland. The results obtained by the experiments have shown that if only a comparatively small portion of the pancreas remains in physiological connection with the duodenum, this portion of the gland retains its normal structure and its physiological function, which, in all of the experimental cases, was found

adequate to supply the requisite quantity of pancreatic juice necessary for the maintenance of normal digestion. While the surgeon may unhesitatingly remove the tail and a portion of the body of the pancreas without fear of any immediate or remote ill effects, great care must be exercised in operating in the vicinity of the head of the pancreas to preserve the integrity of the common duct, and as much of this portion of the organ as may appear compatible with the condition which necessitated the operation.

The results of the experiments made with a view to ascertain how much of the mesentery of the duodenum can be detached without causing gangrene of the bowel have been such as to encourage a conservative plan of treatment when operating in close proximity to the intestine. The observations made in this direction have shown that it is comparatively safe to detach a portion of the mesentery even to the extent of one to three inches, a procedure incomparably easier and much safer than enterectomy combined with partial excision of the head of the pancreas. I wish again to emphasize the fact that complete extirpation of the head of the pancreas with the common duct is never justifiable, and that operations upon this portion of the gland for injury or disease, for the present at least, must be limited to partial excision of the head, with preservation of the common duct.

Acute Pancreatitis.

Acute idiopathic pancreatitis is an exceedingly rare affection; only a few well-authenticated cases of the disease have been reported. A brief consideration of this affection is necessary in connection with our subject for the purpose of calling attention to a few of the most constant and prominent symptoms which characterize the disease, inasmuch as all suppurative lesions of this organ, which are of special interest to the surgeon, are preceded by inflammation. The disease originates either primarily in the inter-acinous connective tissue of the organ as a pancreatitis, or it occurs as a secondary disease from extension of a peripancreatitis to the substance of the gland. Haller and Klob have given an accurate clinical description of a case observed at the Allgemeine Krankenhaus in Vienna, with a careful account of the post-mortem appearances (Schmidt's *Jahrbücher*, 1860, vol. i. p. 306).

Case I.—A gilder, sixty-three years of age, had been suffering from indigestion, which was referred to a defective stomach digestion. Flatulency and vomiting were prominent symptoms. The patient was anæmic, and presented a cachectic appearance; tongue slightly coated, anorexia, epigastrium tympanitic and tender to pressure. Vomiting of a thin, yellow, bitter fluid. Slight elevation of temperature; pulse 90; lower extremities œdematous. The same evening vomiting, collapse, and great pain in epigastrium, extending over the abdomen. During the night obstinate vomiting, traces of blood in the ejected matter; urine dark colored, contained no albumen. Next day vomiting ceased, but collapse increased, followed by death toward evening. The autopsy revealed serous infiltration of gray matter of brain and lungs.

Stomach collapsed, its mucous membrane bulging. The posterior wall of the stomach was perforated in three places, the openings being as large as a pea, and funnel shaped, with the larger extremity directed toward the peritoneal surface. The edges of these perforations were quite friable, discolored, and continuous with a fetid abscess cavity, which extended from the posterior surface of stomach to the spinal column, and from the spleen to the pylorus, in which the pancreas was found as a grayish, discolored, flabby, thin, and exceedingly fragile mass infiltrated with pus. In front of the anterior wall a fringed portion of the bursa omentalis was found, and on the upper border the arteria and vena lienales were seen; the latter was filled with a thrombus. Examined under the microscope the parenchyma of the gland showed that the cells were degenerated, being distended and turbid; acini separated, at some places collapsed, and the spaces between them contained granules and large globules of fat. In this case the course of the disease was quite acute, terminating in diffuse suppuration, and death after an illness lasting only sixteen days. The absence of disease in any of the adjacent organs, and the advanced pathological changes in the gland, pointed to the pancreas as the primary starting-point of the inflammation.

CASE II.—Mayo (*Outlines of Human Pathology*, London, 1836, p. 409) also gives an interesting description of a fatal case of subacute pancreatitis, with the post-mortem appearances. The patient, twenty-one years of age, when five months advanced in pregnancy lost her usual healthy appearance, and gradually became very anæmic. She complained of great thirst, and also suffered much from pain in the epigastric region, which was sometimes so severe as to oblige her to retire to her apartment. After her delivery the thirst remained, and the weakness and paleness increased. Her state and symptoms were like those of persons who have lost large quantities of blood. About five days before death the stomach became irritable, and nothing but rennet-whey in small quantities was retained. She died five weeks after delivery. Upon inspecting the body the viscera generally were found pale and bloodless. Except serous effusion on the membranes of the brain and the abdominal organs no pathological changes were observed, except that the pancreas was throughout of a deep and dull red color, which contrasted very remarkably with the bloodless condition of other parts. It was firm to the touch externally; and when an incision was made into it the divided lobules felt particularly firm and crisp.

CASE III.—Haidlen (*Centralblatt für Gynäkologie*, Sept. 29, 1884) reports the following case from Fehling's private practice. A woman, aged thirty-three years, became pregnant, and during the period of gestation had considerable gastric disturbance and headache. She remained well three weeks after delivery, when there was some hemorrhage. A little later she had two attacks of pain in the region of the stomach, and five and a half weeks after delivery she had a very severe attack of pain in the pyloric region, accompanied by vomiting. There was no elevation of temperature, the pulse was 100 to 104, and regular. The epigastric region was sensitive to pressure, but there were no symptoms of peritonitis, the skin was pale and not jaundiced. The patient seemed somewhat collapsed. In the afternoon of that day she seemed worse, the skin was paler, the pulse more rapid, and the vomiting had ceased. Physical examination showed marked swelling of the abdomen, and great sensibility of pyloric region. No pelvic disturbances. On the following day the patient was better, but the symptoms returned, and she died, in collapse, in ninety-six hours.

The autopsy showed that there was no peritonitis, though a small amount of a dirty, bloody-looking fluid was found in the lower part of the peritoneal cavity. The organs, with the exception of the pancreas, were normal. The pancreas had undergone considerable changes; it was larger, thicker, and broader than normal, and in only a few places was its normal color retained; it had changed almost entirely to a brownish-red, blood-suffused mass, containing a small clot of blood on the anterior surface, in contact with the mesentery, but there was no perforation anywhere. The adjacent portion of the mesentery was suffused with blood. Ziegler, who made the microscopic examination, pro-

nounced the case one of acute pancreatitis, and stated that the duct of Wirsung was somewhat dilated, and that he also found small-celled infiltration of the pancreatic tissue.

REMARKS.—The immunity of the pancreas from disease is attributed by Gross to the singular structure of this organ, to its concealed situation, and to the absence of everything like a proper envelope. (*Elements of Pathological Anatomy*, Philadelphia, 1857.)

The first two cases may serve as types of the two distinct forms of inflammation of the connective tissue of the pancreas, the suppurative and interstitial. Another form, the parenchymatous variety, is occasionally met with in the puerperal state, and in cases of typhoid fever, pyæmia, yellow fever, and other acute infectious diseases, the post-mortem appearances of which are illustrated by Case III. In this form the pancreas is red, swollen, and œdematous. Microscopically in this variety the most prominent lesion consists in swelling and undue granulation of the glandular epithelium and hyperæmia. (Delafield and Prudden, *Pathol. Anatomy and Histology*, New York, 1885, p. 369.)

In the first case the symptoms were acute, and the disease terminated in death in the short space of sixteen days. The suppurative inflammation beginning in the interstitial tissue involved the entire gland, and extended by continuity to the para- and peri-pancreatic tissue, giving rise to a diffuse and acute abscess. The termination is sufficient evidence that the inflammation was produced by a specific cause—the pus microbes. In the second case the primary seat of the inflammation was the same, but the process assumed a subacute character, and terminated in a hyperplasia of the connective tissue. The most prominent symptoms in both cases were severe pain in the epigastrium, progressive anæmia, and vomiting. In both cases the pain assumed a neuralgic character. The pain was referred to the region of the cœliac plexus, radiating from there over the abdomen. Neuralgia of the cœliac plexus is one of the most constant symptoms of disease of the pancreas, as Klebs alludes to it as being present eleven times in fifteen uncomplicated cases. Atrophy of the cœliac plexus is mentioned by Klebs as the cause of the neuralgia.

A high degree of anæmia was apparent in both cases from the extensive area of tissue which was found in an œdematous condition, as well as from the statement of Mayo, that his patient presented the appearance of a person who had suffered from repeated and severe hemorrhages. As the pancreas is not concerned directly in the function of hæmatogenesis, we can only explain the constancy with which this symptom is mentioned, by assuming that the anæmia was due to imperfect digestion and assimilation, caused by an arrest of pancreatic secretion. Vomiting was an early and troublesome symptom in the first case, but appeared only toward the close of the disease in the second case. No reference is made

to the condition of the stools in either case. The presence of undigested fat in the stools is, however, one of the rare symptoms of disease of the pancreas. Klebs states that in three cases where this symptom was present, the ductus Wirsungiani was either entirely or partially obliterated, while in a number of cases where the duct was in the same condition the stools remained normal.

Chronic Interstitial Pancreatitis, or Sclerosis of the Pancreas.

This lesion consists in an increase of interstitial connective tissue which may affect the entire organ or remain limited to some particular portion, more especially the head of the gland. During the early stages of the disease the organ is enlarged, more vascular and firm, while later the cicatricial contraction of the interstitial deposit produces atrophy of the parenchyma, with a corresponding diminution in the size of the organ. This form of inflammation of the pancreas is of particular interest to the surgeon, as the cicatricial contraction may produce secondary changes in the pancreatic or bile-ducts, an occurrence which would indicate a resort to surgical measures for the relief of immediate symptoms due to retention of the secretions.

The causes which produce sclerosis are often obscure, but usually referable to some antecedent affection in some of the adjacent organs of the pancreas, as the peritoneum, subperitoneal tissue, duodenum, the common bile-duct, or pancreatic lithiasis, where the primary cause is in the pancreas itself. The connective tissue proliferation destroys the parenchyma by compression and constitutes one of the causes of stenosis of the pancreatic duct.

Case I.—Todd (*Dublin Hospital Reports*, vol. i.) observed this condition in a girl fourteen years of age, in whom the head of the pancreas and the neighboring connective tissue were the seat of the disease. This case is of unusual interest, as the contraction of the cicatricial tissue produced obstruction of the common bile-duct by compression, which caused a dilatation of the bile-ducts behind the seat of obstruction, converting them into a large sac, which was located behind the duodenum and reached downward as far as the sacrum and laterally from one kidney to the other.

Case II.—O. Wyss (Virchow and Hirsch's *Jahresbericht*) gives a description of another case in point. A man, fifty years of age, became deeply jaundiced and had from three to four loose, clay-colored stools daily. He died after an illness of four and a half months' duration. At the autopsy the liver was found enlarged and of a deep olive-green color. Gall-bladder and bile-ducts were much dilated and contained inspissated bile. The common bile-duct entered the head of the pancreas 4 cm. before its termination in the duodenum and traversed the indurated portion of the organ for a distance of 2.5 cm. At this point the duct was found so much contracted that only a fine probe could be passed through it. The common pancreatic duct was dilated, also its branches, which at some points were dilated in the form of cysts, varying in size from that of a hempseed to that of a hazelnut. Wyss attributed dilatation of the common duct to compression by one of the smaller cysts in the head of the pancreas, but it is more than probable that the dilatation was due to the cirrhotic contraction of the organ.

That icterus is not a constant symptom of this condition is illustrated by the following case, reported by Claessen.

CASE III.—A man, thirty years of age, had been subject to indigestion, constipation, and severe pain in the epigastrium for several years. After his death it was shown at the autopsy that the head of the pancreas and the acini were yellow, and the inter-acinous connective tissue abundant, and yet the duct of Wirsung and the bile-duct were not contracted.

REMARKS.—The surgical treatment of sclerosis of the pancreas can only apply to secondary lesions which result from stenosis of the pancreatic or bile-ducts and distention of these passages by accumulation of the secretions. Such an occurrence is most apt to take place when the disease affects the head of the pancreas, as the cicatricial contraction in this locality may cause stenosis of either the duct of Wirsung, the common bile-duct, or both. Any operative interference in these cases will be of necessity limited to an attempt to secure an artificial outlet to the retained secretion. The restoration of the permeability of the natural outlet by any method of treatment is entirely out of question.

The tendency of the disease is to aggravate the obstruction as cicatricial contraction progresses. The history of all these cases pointed to an impairment of digestion as the principal clinical feature in each instance. It is, therefore, of considerable importance to examine carefully into every obstinate and obscure case of indigestion, with a view to eliminate the possibility of organic disease of the pancreas as the cause of the derangement of digestion. In cases of permanent retention of the bile or the pancreatic juice caused by cicatricial compression of the bile-duct or the pancreatic duct, the earlier symptoms will have reference to a history of obstinate indigestion, progressive in its character. If, on the other hand, the obstruction is produced by the impaction of a calculus, the previous history points to attacks of sudden and severe pain and other symptoms indicative of the passage of a calculus along the excretory duct.

In case of biliary retention cysts, as represented in Case I., the establishment of an external biliary fistula would result in a permanent fistula, as the impermeability of the bile-duct would preclude the possibility of reëstablishing, by any kind of an attempt, the normal communication between the dilated bile passages and the intestine. Such an operation would remove only the urgent symptoms due to retention and absorption of bile, but would leave unchanged the primary cause of the retention and would exclude, permanently, the bile as a digestive fluid from the alimentary canal. As the obstruction is permanent and irremediable, the operation which suggests itself as fulfilling the urgent indications, as well as preventing remote ill consequences, is the formation of a new outlet for the bile into the intestinal canal, by establishing a permanent fistula between the duodenum and the gall-bladder, or

between the duodenum and the dilated bile-ducts. Duodeno-cholecystostomy has a future in all cases of permanent and incurable obstructive lesions in the bile-duct, and will become an established operation as soon as it has been perfected by an improved technique.

My experiments on animals have demonstrated that physiological detachment of any portion of the pancreas is invariably followed by degeneration and atrophy, irrespective of the particular method by which this detachment is effected, consequently it is only reasonable to assume that permanent obliteration of the pancreatic duct by cicatricial contraction is always followed by degeneration of the parenchyma of the gland on the distal side of the seat of obstruction.

It is on this account that stenosis of the pancreatic duct is seldom followed by dilatation of the ducts to any considerable extent on the distal side of the constriction, and even more seldom by the formation of a cyst. A retention cyst can result from obstruction only so long as secretion has not been entirely suspended, and when, at the same time, absorption of the pancreatic juice does not take place on account of further extensive pathological changes in the structures which perform this function when the gland is otherwise in a normal condition.

As the physiological detachment by obstruction of the common pancreatic duct caused by cicatricial contraction, is invariably followed by complete destruction of the parenchyma of the contributory portion of the gland, it is evident that the surgical treatment of a cyst of the pancreas in such cases can be indicated only when the swelling becomes, in itself, a source of serious inconvenience and pain. The proper treatment in all such cases consists in the formation of an external pancreatic fistula by abdominal section. There is no danger, in such instances, of the fistula remaining permanent, as the glandular tissue which might remain at the time of operation will, in the course of time, disappear by degeneration and absorption. As in animals, so in man, the health of the individual after gradual atrophy of the pancreas will depend upon the physiological capacity of vicarious organs, in each particular case, to assume the functions of the pancreas.

In recapitulation, it may be stated that cirrhosis or chronic interstitial pancreatitis sometimes produces stenosis of the bile-duct or the pancreatic duct, and that, when the obstruction is followed by retention of the secretions, an operation becomes always necessary in biliary retention, which should be treated by establishing a new outlet for the bile into the duodenum, while the formation of an external pancreatic fistula in cases of cyst of the pancreas becomes necessary only when the presence of the swelling in itself has become a source of sufficient pain and discomfort to warrant treatment by abdominal section.

Gangrene of the Pancreas.

One of the terminations of acute inflammation of the pancreas is gangrene. Cases have been reported where spontaneous recovery followed elimination of the necrosed organ through the alimentary canal. If spontaneous recovery in this condition is possible, it would seem plausible that a timely removal of the necrosed organ by surgical interference would add to the chances of recovery, consequently we shall add gangrene as one of the diseases of the pancreas which should be treated by operative measures.

Case I.—Trafoyer, of Hernals, treated a patient suffering from what appeared to be a passage of gall-stones. During the course of the disease the patient passed, per rectum, a solid mass, the nature of which could not be readily ascertained. This mass was sent for examination to Rokitansky, who found in it gall-stones and a large part of the pancreas in which the duct was plainly visible. Rokitansky believed that a portion of the pancreas had become invaginated into the duodenum and had sloughed. Nothing could be ascertained concerning the subsequent history of the case. (*Allgem. Wiener Zeitung*, No. 29, 1862.)

Case II.—Reported by Chiari (*Wiener med. Wochenschrift*, Nos. 6 and 7, 1881). Female, aged forty-six years, who had been subject to occasional attacks of pain in the stomach. She was seized suddenly with severe pain in the abdomen, followed by vomiting and other symptoms of diffuse peritonitis. Toward the close of the disease she had a chill, and vomited a black, very offensive fluid. At the necropsy the pancreas was found separated from all its attachments and of a brownish color. The duodenum and transverse mesocolon were perforated, and the bursa omentalis contained an offensive sanious fluid, consecutive to diffuse peritonitis. The pancreatico-duodenal artery was eroded.

Case III.—(*Ibid.*) Patient, a man thirty-eight years of age, was attacked with symptoms indicative of cholelithiasis, followed by symptoms of obstruction of the bowels which lasted for a number of days, and subsided only after the patient passed, per rectum, the greater portion of the necrosed pancreas. The patient recovered.

Case IV.—Israel reports (Virchow's *Archiv*, vol lxxxiii. p. 181) a case of necrosis of the pancreas in a patient suffering from diabetes mellitus. The autopsy showed a fluctuating tumor between the stomach and transverse colon which revealed itself as a cyst, with thick walls firmly adherent to the intact head of the pancreas. The cyst contained 300 c. cm. of a clay-colored fluid, in which crystals of hæmatoidin were found, and the necrosed body and tail of the pancreas. Israel attributes the cause of the destructive process to an inflammation of the peripancreatic tissue, which had given rise to repeated hemorrhages into and around the pancreas. The disease of the pancreas, he holds, was not the cause but the effect of the diabetes.

Case V.—Prince ("Pancreatic Apoplexy, with a Report of Two Cases," *Boston Med. and Surg. Journ.*, July 13 and 20, 1883) reports the following case: A man, twenty-two years of age, during a violent exertion, was taken with a severe pain in the abdomen, followed by pain in the epigastric region, vomiting, chills, and a sensation of great oppression and uneasiness. In a few days diarrhœa followed, and during the third week he died. At the autopsy the anterior abdominal wall was found firmly adherent to the omentum and intestines; between the intestinal convolutions a chocolate-colored fluid was found. The greater portion of the pancreas was destroyed and converted into a black gangrenous mass. The mesentery of the upper portion of the jejunum, which was adherent to the lower margin of the transverse colon, showed in its folds an accumulation of thick greenish pus.

CASE VI.—Reported by Rosenbach (*Centralblatt für Chirurgie*, 1882). A woman, fifty-seven years of age, otherwise in good health, had suffered some time ago from pain in the abdomen and constipation, but was soon relieved. Three weeks before she came under observation of the reporter, the same trouble returned. The bowels had not moved for three days; frequent vomiting of greenish fluid; great weakness. On examination, a fluctuating tumor the size of a child's head, was detected in the epigastric region, behind the stomach, which was considerably dilated. The tumor was immovable. As the symptoms pointed to intestinal obstruction of some kind, and failed to be relieved by enemata, it was decided to perform laparotomy, to which the patient readily consented. The abdomen was opened through the median line, but, as the tumor was not rendered sufficiently accessible, a transverse incision was made over the part most prominent. After division of the mesocolon an effort was made to enucleate the tumor, but the inflammatory adhesions were so firm that the attempt had to be abandoned. An effort was then made to push the stomach upward, but this likewise failed. During these manipulations the tumor ruptured and at first clear, then turbid offensive fluid poured out. The fluid was removed without soiling the peritoneal cavity. The sac was then stitched to the margins of the wound. After suturing the remaining portion of the external incision the opening in the sac was enlarged and drained. The patient died of shock six hours after the operation. At the autopsy the necrosed pancreas was found in the sac. The abscess cavity extended behind the stomach and lesser omentum. The intestinal obstruction was caused by pressure of the swelling upon the small intestine.

REMARKS.—The pancreas may constitute one of the component parts of the intussusceptum in cases of invagination of the bowels, as such a case has been reported by Bandl, and the specimen examined by Rokitansky furnishes a similar illustration. The second case reported by Chiari may have been of a similar nature, the invaginated portion having sloughed with the remaining portion of the intussusceptum, leaving the continuity of the bowel unimpaired by adhesions at the point of separation. If, in this instance, the necrosis was due to inflammation, we can only infer that the parapancreatic abscess ruptured into the bowel, and that the necrosed portion of the pancreas was eliminated in this manner, and that subsequently the opening in the bowel was closed. Constipation was a prominent symptom in a number of these cases, and in Rosenbach's case the symptoms of obstruction were so well marked that it was decided to perform laparotomy for its relief. This last case is also of great interest, as during life the existence of a tumor in the region of the pancreas was diagnosticated.

Modern surgery deals extensively with abdominal section for the relief and cure of peritonitis and intestinal obstruction. In searching for the cause of either of these conditions during laparotomy, the pancreas should not be forgotten, and when it is found that the primary disease is located in or around this organ, radical measures should be adopted whenever such a course appears practicable.

Whenever the sac can be stitched to the external incision this should be done, and the sac opened, disinfected, and drained. Search should be made for the necrosed pancreas, and when found detached it should

be removed. As in most of these cases the retroperitoneal tissue is extensively infiltrated, a counter-opening should be made in the lumbar region, and through drainage established. If an anterior abdominal fistula cannot be established, the course to be pursued should be the same as in treating a pancreatic abscess under similar conditions.

Abscess of the Pancreas.

At the present time no one familiar with the recent advances in surgery would question the propriety of treating a suppurating cavity by incision and drainage, wherever it might be located. Some of the most valuable recent contributions to surgical literature describe improved methods in treating deep-seated abscesses. Asepsis and effective drainage are the two cardinal points upon which we have learned to depend in the treatment of abscesses in important organs or cavities. If we can secure and maintain these two essential conditions, we can attack with immunity and a fair hope of success, any abscess wherever it may be located, and whatever its immediate surroundings may be.

In looking over the literature on abscesses of the abdominal organs, we find that modern surgery has been guided almost exclusively by the teaching of the old master: *Ubi pus—ibi evacuo.* It is somewhat surprising that abscess of the pancreas has never been made the subject of surgical treatment. The two principal reasons for this may be found in the facts that abscess of the pancreas is of rare occurrence, and that the recognition of the lesion, when it does exist, is surrounded by many difficulties. There can be no doubt, however, that in the near future abscess of the pancreas will be treated on the same principles as suppuration in any other locality.

The remote location of the abscess may offer many serious obstacles to diagnosis and a rational course of treatment; but these difficulties will be overcome by improved methods of examination, and more perfect methods of operation. As suppuration is only one of the terminations of inflammation, abscess, like inflammation, may occur primarily in the gland itself, or it may commence in the para- or peri-pancreatic tissue. If the abscess is endo-pancreatic, it may be bounded and circumscribed by the proper investment of the gland; if, on the other hand, it commences primarily outside of the gland, it appears as a diffuse abscess, which extends to the pancreas by contiguity; in other words, we speak of the abscess as a suppurative pancreatitis, or a suppurative peri- or para-pancreatitis.

Case I.—Frison ("Pancreatite suppurée," *Recueil de mém. de méd. mil.*, Mai, Juin, 1876) reports a case of abscess of the pancreas following suppurative pancreatitis, where the collection of pus did not extend beyond the limits of the gland. An otherwise healthy mulatto, twenty-eight years of age, farmer, was attacked in June, 1873, by icterus with no fever. Appetite diminished. The symptoms were not of sufficient severity to keep him from his work. In

August he complained of pain in the right hypochondriac region, which was soon followed by ascites and œdema of legs and scrotum. He was troubled at this time by an intense thirst and voided large quantities of urine, which, on examination, was found to contain sugar. The liver was enlarged and the patient emaciated rapidly. No fever or diarrhœa. Stools clay colored. Appetite gradually declined and the patient died in a state of advanced marasmus.

Autopsy. Intestines and stomach normal. Pancreas enlarged to three times its normal size and infiltrated with pus; the splenic end was distended by a large abscess. Gall-bladder and bile-ducts greatly distended. Liver olive-green in color and contained three abscesses, but otherwise healthy in structure.

REMARKS.—In this case the symptoms during life pointed to the liver as the seat of the disease. The jaundice was undoubtedly produced by stenosis of the bile-duct, either by a catarrhal inflammation of the duct itself, or compression of the duct by the inflammatory exudation which attended the acute inflammation of the pancreas. The ascites was more likely the result of an inflammation of the peritoneum overlying the pancreas than of an obstruction to the portal circulation. The suppuration in the pancreas was not attended by an increase of temperature. The diabetes was probably due to the disease of the pancreas, and was not a coincident affection, as a number of cases of diabetes have been reported which occurred in the course of some disease of this organ.

CASE II.—Timoteo Riboli (*Schmidt's Jahrbücher*, 1859, 2, p. 177) reports the case of a woman, aged fifty-seven years, who suffered from impairment of digestion, loss of appetite, emaciation, and attacks of vomiting in the forenoon. The tongue was coated. No fever, but night sweats. Bismuth and magnesia improved the symptoms for a time, but soon the disease became aggravated. Hepatitis was diagnosticated, inasmuch as the patient became icteric and complained of a deeply seated dull pain in the region of the liver and epigastrium. Among a number of colleagues who saw the case in consultation, Tommasini was the only one who believed that the pancreas was the seat of the disease. The patient was emaciated to a skeleton and died of inanition. At the autopsy the pancreas was found distended with pus. Gall-bladder was distended with bile. Liver congested. No other pathological conditions were found, which might serve to explain the cause of death.

REMARKS.—The course of the disease in this case was again afebrile. The symptoms simulated disease of the liver even more closely than in the preceding case, as no mention is made of the presence of sugar in the urine. The suppuration did not extend into the para-pancreatic space.

CASE III.—The following case is described by Dr. James Kilgour (*London Journal*, Nov. 1850). The patient was a man, forty-one years of age, who was treated for several years for what was termed bilious dyspepsia. In March, 1850, when first seen by the reporter, he was considerably emaciated and of a melancholic disposition. A prominent symptom was vomiting, especially in the morning, and about two hours after meals. The matter vomited was a sour, viscid fluid, varying in quantity from an ounce to a quart. Skin dry and of a yellowish hue. No diarrhœa, and the stools contained no bile. Urine of sp. gr. 1.022, normal in quantity, loaded with urates and contained some fat. Pulse small, 100. No pain in abdomen. On left side, from bor-

der of stomach to crest of ilium, abdomen was dull on percussion, on palpation inelastic, nodulated, and of a doughy feel. The area of the swelling was not well defined. Neither fluctuation nor pulsation could be felt. During the middle of the month of May, the patient complained of chilly sensations, and the area of dulness increased toward the left. Toward the end of the month the chills disappeared and the abdomen became tender and elastic above. During the latter part of July, the legs became œdematous and the patient was somewhat delirious. Toward the close of the disease he was again attacked by a number of chills and died July 28th.

Autopsy. Stomach distended with gas, walls very thin, pylorus indurated and slightly narrowed. Duodenum softened by inflammation, the portion near the pancreas being converted into a pultaceous mass. Liver normal. Spleen enlarged one-third. Pancreas enlarged to the size of a teacup, its left end being attached to the suprarenal capsule on same side. On incising the pancreas a milky fluid escaped. The entire gland was converted into a single sac, which contained purulent fluid with some cheesy particles and fragments of cellular tissue.

REMARKS.—In this case the symptoms were sufficiently clear which would, at the present time, enable an accurate observer to make a probable diagnosis of abscess of the pancreas. The obstinate vomiting, with the absence of signs of disease of the liver and the progressive emaciation should have led at least to a suspicion of disease of the pancreas.

The location of the tumor was also suggestive of the primary starting-point of the swelling. The abscess cavity was larger than in the preceding cases, and the presence of pus was also suggested by the chills which were present at the beginning and close of the disease. As the abscess cavity was single, this would have been a proper case for surgical treatment. A somewhat uncommon feature in this case was almost complete absence of pain, a symptom which has been considered by Claessen characteristic of disease of the pancreas. The character of the fluid in the cyst would indicate that it was a mixture of pus and pancreatic juice. As in other secretory organs, the suppurative process may commence in the duct and extend to the interstitial connective tissue by continuity. This is the manner in which the presence of foreign bodies, such as parasites or calculi, in the duct, gives rise to abscess of the pancreas. In the following case the inflammation of the duct and the consecutive interstitial suppurative pancreatitis were attributed to the presence of an intestinal worm.

CASE IV.—Reported by Shea (*Lancet*, November 5, 1881). The patient was a woman, aged twenty-nine years, who complained of abdominal pain and was jaundiced. After a few days, she improved under a mild alkaline treatment, but about three weeks subsequently again became worse. The pain was in the region of the pancreas. At the same time she suffered from nausea followed by vomiting; jaundice reappeared. Active treatment was resorted to, but she soon became unconscious and died forty-eight hours subsequently. The necropsy showed that the body was fairly nourished and distinctly jaundiced. The lungs were slightly congested at the base. Liver large, pale, and soft. Pancreas enlarged and hard, being the seat of an abscess containing pus. A round worm, seven inches long, was found folded upon itself, lying in and obstructing the pancreatic duct, the larger portion of the worm being in the duodenum. The intestines were healthy. In the

absence of any other disease, death in this instance must have resulted from inflammation of the duct and parenchyma of the pancreas by the irritation induced by the presence of the worm. The jaundice was undoubtedly produced by the same cause.

Positive evidence is wanting in this case to prove that the suppuration was caused by the presence of the parasite, as the worm might have entered the pancreatic duct after death. We have evidence that in many cases ascarides were found in the ductus pancreaticus, without the presence of abscess or even inflammation. Davaine (*Traité des Entoz.*, p. 115) relates that he has found them present in this locality in four cases, and in none of them had secondary inflammatory changes taken place. Klebs found six worms in one case, four in the head and two in the tail of the pancreas.

CASE V.—Mayo refers to a case that came under the observation of Percival (*Outlines of Human Pathology*, London, 1836, p. 409). The patient was a gentleman who had jaundice and bilious vomiting. A tumor appeared at the epigastrium; his strength failed; blood and fetid pus were discharged by stool, and he died exhausted in three months. At the necropsy the pancreas was found greatly enlarged and contained a considerable abscess; the ductus communis was obliterated by the pressure.

The class of cases which are of special importance and interest to the surgeon are those diffuse abscesses which take their origin in the parapancreatic connective tissue: extensive collections of pus as we observe them in cases of parapancreatitis purulenta. As the glandular tissue is not primarily affected in these cases, early evacuation and drainage of the abscess cavity would not only preserve the anatomical and functional integrity of the gland, but would also serve as a life-saving measure by securing an early outlet of the abscess contents.

The case reported by Haller and Klob, and referred to under the head of pancreatitis, Case I., furnishes a good illustration of cases belonging to this class.

CASE VI.—An interesting case of abscess of the pancreas has recently been reported by Musser (AMERICAN JOURNAL OF THE MEDICAL SCIENCES, April, 1886, p. 449). The patient was a male, aged forty-two, shoemaker, who was admitted to the wards of the Presbyterian Hospital, May 12, 1885, and died June 6th following.

He was of intemperate habits, but his general health had always been good. His poverty had exposed him to all kinds of hardships. The duration of the present illness was not known, but from his statements it was ascertained that his health had been failing all spring. He had never received any injury. He was considerably emaciated. He vomited only once, and that was on the day of admission. Marked ascites was observed, but nothing else could be found. He remained in a stupid condition, took but little food, and manifested no signs of pain. No fever, no sweating. Palpation showed the liver and spleen to be normal, while an ill-defined tumor could be felt in the epigastric region. Urine contained a trace of albumen, but no casts. The ascites was so great as to warrant tapping, and this was accordingly done. The abdomen was thirty-six inches in circumference at the umbilicus before tapping. Within eighteen hours after tapping, it had filled entirely, and in twenty-four hours measured thirty-two and a half inches. He died of exhaustion.

After death, by palpation a fixed mass was detected in the abdomen, extending from the right mammary line, one inch above the umbilical line, directly across to the corresponding line on the left side. Its upper margin was not well defined, but it appeared to be two inches wide. The abdomen was filled with serum in which some lymph floated. The intestines were matted together by recent lymph. The peritoneum showed signs of inflammation. Corresponding to the position of the mass indicated by palpation, the omentum was found matted together, with its inferior border turned upward, and lying across the stomach. This organ was fixed and dilated, its inferior border extending to the umbilicus. The liver occupied its normal position. The transverse colon extended across the abdomen along the lower margin of the stomach, thus permitting the omentum to occupy the position indicated above. Further study of the relations of the abdominal organs revealed the formation of a large cavity containing about a quart of pus. This cavity was formed by the posterior wall of the stomach in front, by the pancreas, duodenum, and transverse colon below, and by an extension, or rather distention, of the peritoneum above and behind. Certainly the pus did not fill the retroperitoneal space or extend into it, and was not in close apposition to the diaphragm or brim. It was situated in the duodeno-jejunal fossa. Adhesions prevented communication with the abdominal cavity and the retroperitoneal space. This abscess cavity communicated with a large abscess in the pancreas. This abscess, of the size of an orange, was situated in the head of the organ, its point of rupture into the duodeno-jejunal fossa being in the middle and upper part.

The remainder of the pancreas was made up of dense connective tissue, throughout which there were innumerable pus pockets, varying from a pea to a pecan nut in size. The secreting tissue of the organ was not discernible to the naked eye. The ducts were not occluded, but rather dilated, and no calculi were found. The portal vein was filled with a purulent thrombus. The splenic vein was also partially closed by a soft thrombus. The superior and inferior mesenteric veins were completely blocked by firm, laminated thrombi, which were firmly adherent to their walls. On microscopical examination, the pancreas was found to be made up of old and young connective tissue; in the large interstices of the bundles of old tissue, the glandular structure could be readily made out, while the tubules were seen to be in a state of catarrhal inflammation. The intertubular connective tissue was crowded with young cells.

REMARKS.—In this case the conditions were favorable for successful treatment by abdominal section had even a probable diagnosis been made before the extensive and serious complication of thrombophlebitis occurred. The symptoms during life simulated cirrhosis of the liver so closely that it was impossible to differentiate between this affection and disease of the pancreas, although an ill-defined tumor could be felt in the epigastric region. In similar cases an exploratory laparotomy should be done for the purpose of making a positive diagnosis, and, when similar favorable conditions are found, it could be followed at once by radical measures with a view of securing evacuation and drainage of the abscess cavity. In this case the abscesses in the viscus were the result of a purulent pancreatitis; the secondary abscess, of perforation into the duodeno-jejunal fossa followed by suppurative peripancreatitis.

Recent investigations have shown the existence of a direct causative relation between the pus microbes and suppuration, hence we must take it for granted that every purulent pancreatitis, peripancreatitis, or para-

pancreatitis is caused by the presence of these germs in the tissues. In case there is no direct invasion by a loss of continuity of the hollow viscera in the vicinity of the pancreas, or no direct communication with the external air by a penetrating wound, we must assume that the germs reach the gland through the circulation, and find a favorable soil prepared by some antecedent pathological changes. Such conditions may be determined by contusion of the organ, disturbance of the capillary circulation by various causes, or thrombophlebitis. Norman Moore reports the case of a female, twenty-seven years of age, who had died of pyophlebitis, and where, on post-mortem examination, beside the portal, splenic, and vena azygos minor veins, the pancreatic veins were also blocked by decolorized and adherent thrombi. ("Pathological Observations on the Pancreas," *St. Bartholomew's Hospital Reports*, vol. xviii. p. 207.)

In the *Pathological Society's Transactions* the same author gives an account of two cases of abscess of the pancreas due to plugging of the pancreatic vessels. On page 210 he remarks:

"Pathologically, the case in which thrombosis of the pancreas was found is interesting as indicating how pancreatic abscess is produced. The much commoner condition of the liver in the other cases shows that, had the first patient survived, the thrombosis would certainly have been followed by abscess. Clinically, the value of the case is, that it may, in rare cases, help to explain the seat of an obscure abdominal swelling, associated with fever, which has followed a thrombosis, and which physical examination cannot localize in the liver."

Suppuration always begins in the interstitial tissue, either within the gland or in the connective tissue around it. A suppurative inflammation and formation of an abscess are different stages of the same process. Peripancreatitic suppuration commences, in most instances, in the adjacent lymphatics, the pus surrounding the lymph glands, or forming a small abscess.

In the vicinity of the pancreas these perilymphatic abscesses are not unfrequently met with as one of the pathological conditions of pyæmia. Thus, an abscess in the pancreas with perforation into the peritoneal cavity, was examined by Perle (*De Pancreas ejusque morbis*, Dissert. Berol., 1837). Tulpius saw an abscess of the pancreas as a secondary lesion after an attack of malarial fever. Schmackpfeffer observed the same conditions after an operation for strangulated hernia, and Portal after extirpation of a testicle. But suppuration in the pancreas sometimes takes place as an independent affection, without the presence of an appreciable infection-atrium, and in these cases we must assume that the essential and specific noxæ are carried along with the circulating blood, and that localization takes place upon a soil prepared for their reception and growth by previous alteration in texture or circulation. In some instances the process begins upon the outer surface of the gland, the pus

separating the gland from its attachments. In the case described by Gendrin the pancreas appeared to have been completely detached, and was lying loose in the abscess cavity.

Many of these parapancreatic abscesses do not present well-defined borders; the pus manifests a tendency to burrow in the vicinity of the mesocolon and the retroperitoneal space, and is apt to perforate into the bursa omentalis, or into some other portion of the peritoneal cavity, or, lastly, finds its way into one of the adjacent hollow organs, as the stomach or intestinal tract. Van Doeveren reports the case of a female, fifty-nine years of age, who had suffered for thirty years from attacks of gastralgia. At the necropsy, it was ascertained that the indurated pancreas had perforated the posterior wall of the stomach. The opening represented a round ulcer, two and a half inches in diameter, with indurated margins. In this aperture eroded vessels could be seen. The fistulous tract communicated with the pancreatic duct. The stomach and intestines contained blood, but no other evidences of disease could be found. In Percival's case the abscess ruptured into the bowel, the stools containing fetid pus and blood. A similar case was observed by Haggarth (*Transactions of the College of Physicians in Ireland*, vol. ii.). The suppurative process, however, may extend in an opposite direction, from the stomach to the pancreas (Rokitansky, *Lehrbuch der pathol. Anatomie*, Wien, vol. iii. p. 168). A communication between the stomach and pancreas is sometimes established by perforation of a gastric ulcer in this direction. Around the margins of the ulcer, between the stomach and pancreas, adhesions are formed, an occurrence which prevents extravasation of the contents of the stomach into the peritoneal cavity. A number of the terminal openings of the ductilis pancreaticis have been observed upon the cicatrized surface of a gastric ulcer. In place of the formation of a permanent pancreatico-gastric fistula, as described by Rokitansky, perforation of the stomach in closer proximity to the pancreas may give rise to diffuse and rapidly fatal parapancreatitis or peripancreatitis.

The indirect primary cause of a pancreatic abscess may be due to the presence of a calculus in the pancreatic duct. Fournier has recorded a case where, on post-mortem examination, an enormous abscess was found in the head of the pancreas, which contained numerous calculi. The tumor was sufficiently large to be readily detected in the epigastric region during life.

An abscess of the pancreas may also originate in a preëxisting cyst of the organ. Kilgour's case, detailed above, had undoubtedly such an origin. The abscess cavity was as large as a teacup, and contained a milky fluid and caseous particles, which were undoubtedly a mixture of pus and pancreatic juice. The disease was attended by chills and fever, which indicated that the retention cyst had become the seat of an acute suppurative inflammation.

As primary, idiopathic, uncomplicated, purulent inflammation of the pancreas is an exceedingly rare affection, it is of great practical importance in the surgical treatment of such cases to determine, if possible, the predisposing cause or causes, and to remove them, or render them inert at the time of operation.

The presence of pus within the pancreas or in its immediate vicinity is not indicated by any characteristic or positive symptoms. The symptoms always point to the stomach or liver as the seat of the disease. The most prominent and constant symptoms which have been observed are nausea, vomiting of a clear greenish or viscid fluid, thirst, loss of appetite, constipation, progressive emaciation, and distention of the epigastrium.

In most all cases the patients presented a sallow, cachectic appearance, and were exceedingly anæmic. Ascites and œdema of the lower extremities were present a number of times. In several instances the inflammatory process in the pancreas extended to the bile-duct, or caused stenosis of the duct by compression, conditions which are followed by biliary retention, a symptom which has been usually interpreted as an evidence of primary disease of the liver or bile-ducts. The progressive anæmia and emaciation, in the absence of other tangible lesions, are symptoms which always should direct attention to the pancreas as the seat of the disease.

Fever was seldom a conspicuous and never a constant symptom of suppurative pancreatitis. The use of the thermometer in the diagnosis of suppuration in this locality is important, but it furnishes no positive evidence. If the abscess is large it will be recognized by palpation and deep percussion as a tumor in the epigastric region. In such cases a probable diagnosis may be made by a careful and systematic physical examination and reasoning by exclusion.

An abscess within the gland is always located in the bursa omentalis; a peripancreatic abscess in the bursa omentalis, duodeno-jejunal fossa, or upper portion of the peritoneal cavity; and a parapancreatic abscess in the retroperitonal space. Inflation of the stomach will often serve a useful purpose in the differential diagnosis of tumors in the epigastric region. In obscure cases, manual exploration of the rectum may add important and sometimes decisive information.

Age is also an important element to be considered in the diagnosis. Most of the cases of abscess of the pancreas were patients of more than forty years of age, and often persons of intemperate habits. Puncture with an aseptic capillary needle will demonstrate the presence or absence of pus, but will not add material information in locating with accuracy the abscess cavity.

Finally, in all cases where a tumor can be felt in the epigastric region, and a probable diagnosis can be made regarding its benign character, an

exploratory laparotomy should be resorted to for the purpose of making an accurate anatomical diagnosis.

The prognosis of abscess of the pancreas is always unfavorable. Death is produced by progressive emaciation and inanition, by septic absorption, or secondary lesions in adjacent organs. In acute, diffuse pancreatic abscess a fatal termination may take place in a few days. One of the great dangers of abscess in this locality is the close proximity of numerous important veins, which become implicated by extension of the suppurative inflammation to their walls, producing a suppurative thrombophlebitis, with all its disastrous consequences. Perforation of the abscess into the stomach or intestinal tract is the most favorable spontaneous termination, and has resulted, at least in one instance, in a cure. Perforation of the abscess into the peritoneal cavity would hasten death by inducing a rapidly fatal septic peritonitis.

The remarkable success which has attended the treatment of pelvic and abdominal abscesses by laparotomy justifies the hope that, in the near future, the same treatment will be extended to abscess of the pancreas. It is true that the difficulties which surround the treatment of abscesses in this region are many, but they are not insurmountable. Multiple abscesses, disseminated throughout the entire organ, and especially its head, are not amenable to successful surgical treatment. Circumscribed endopancreatic abscess in the peripheral portion of the body or tail of the pancreas should be treated by partial excision of the pancreas in all cases where the isolation of that portion of the organ can be accomplished without inflicting serious injury to adjacent important organs. When extirpation is impossible, as when the abscess is located in the head of the pancreas, it must be treated by incision and drainage. This is accomplished in the same manner as in the treatment of a pancreatic cyst. In some instances, the access to the abscess is rendered difficult by distention of the stomach, the dilated organ overlapping the pancreas. In such cases, the stomach must be pushed upward, and subsequent distention guarded against by ordering an absolute diet until the external fistula has been established. The external incision must, in all cases, correspond to the most prominent part of the swelling, as it is of the greatest importance to incise the abscess at a point where the distance between the surface of the abscess and the abdominal wall is the shortest. Incision of the great omentum will be required in all instances.

In making an external fistula in the treatment of a pancreatic abscess it is essential to protect the muscular and connective tissues of the external incision against the contact with pus by lining the margins of the wound with the parietal peritoneum before the serous covering of the anterior wall of the abscess is stitched to the margins of the wound. One of the greatest difficulties that will be encountered in this operation

will be the approximation of the peritoneal surface of the abscess with the margins of the wound, on account of the distance between the surface of the abscess and the anterior abdominal wall; this difficulty will decrease in proportion to the prominence of the swelling.

The size of the external incision will exert an important influence in this direction. If the incision is large the margins of the wound can be turned inward, thus facilitating the suturing of the anterior wall of the abscess to the margins of the wound. As a rule, it may be relied upon that the anterior wall of the abscess, covered by peritoneum, is quite thick, so that there is but little danger of penetrating the abscess cavity with the needle in suturing. Previous evacuation of the abscess cavity by aspiration would diminish the danger of extravasation of pus through the needle punctures, but would also render approximation difficult by the recession of the abscess wall, and should, therefore, not be resorted to unless the swelling is sufficiently prominent to render this circumstance of little importance.

As the suturing of the two peritoneal surfaces is done for the purpose of preventing, in the first place, extravasation of pus into the peritoneal cavity; and, secondly, of securing permanent adhesions between the abscess wall and the margins of the wound, it is important to apply the sutures closely together and to grasp the tissues in such a manner that tearing through of the sutures is impossible. As considerable tension may follow, it would be advisable, in this particular instance, to use silk sutures. As in these cases time is an important element, incision and drainage should follow suturing immediately.

The remaining steps of the operation will depend upon circumstances. If the abscess is endopancreatic or peripancreatic, simple incision, drainage, and disinfection will answer all indications. If, however, the purulent cavity is located behind the peritoneum and occupies the connective tissue space behind the pancreas, it would appear rational to drain the abscess posteriorly through one of the lumbar regions above the kidney by pushing a long closed forceps in a proper direction through the posterior and lateral wall of the abscess until its point can be felt under the skin externally. A small cut in the skin over its point will enable the operator to push the instrument clear through, and, by dilating its blades, widen the canal sufficiently to permit the insertion of a large drainage tube. In this manner the most desirable method of drainage—through drainage—could be established, which would render subsequent disinfection and evacuation of the abscess a comparatively easy task. In cases where an anterior pancreatic fistula cannot be established on account of the distance between the abscess and the anterior abdominal wall, we might resort to lumbar drainage and closure of the incision in the anterior wall of the abscess by carefully inverting and approximating the peritoneum over the wound with fine silk sutures.

That the utmost care in the application of antiseptic precautions should be resorted to in the evacuation of pus in this remote region by any of these procedures requires no argument. I will repeat that a positive diagnosis of the presence and precise location of a pancreatic abscess is only possible by resorting to explorative laparotomy, and that this diagnostitial aid should be always resorted to when the history of the case and the symptoms and signs presented are sufficiently suggestive to point to a probable diagnosis.

The abscess found and located by abdominal section should be removed by partial extirpation of the pancreas when it is endopancreatic and located near the splenic end of the pancreas. When extirpation is impossible, or when it is located in the head or on the anterior surface of the pancreas, it should be treated by the formation of an anterior abdominal fistula; when located behind the pancreas, by through drainage, or lumbar drainage performed through the abdominal cavity.

Hemorrhage of the Pancreas.

A number of post-mortem examinations have shown that certain cases of sudden death were caused by hemorrhage of the pancreas, inasmuch as no other evidences were found which could explain the cause of death. In some as yet unaccountable way, even a moderate hemorrhage in this locality has been sufficient to destroy life. Zenker has affirmed that in these cases pressure upon the solar plexus and semilunar ganglion produces paralysis of the heart, to which he attributes the immediate cause of death. If we recollect that tumors of the pancreas, even when of considerable size, do not destroy life in this manner, it seems that the true explanation of the great danger which attends hemorrhage of the pancreas remains to be ascertained. Practically it is important to differentiate between diffuse hemorrhage into the substance of the organ and its adjacent tissue, and circumscribed accumulations of blood or hemorrhagic cysts of the pancreas, as the latter condition presents more favorable conditions for surgical treatment.

Hemorrhagic Cysts.

Case I.—Anger (*Bulletin de la société anatomique de Paris*, xl., Année 1865, 2me série, tome x. p. 192) reports a case of hemorrhagic cyst of the pancreas in a man, aged seventy-two years, who had been a soldier for ten years, during which time he had received several wounds. Later he suffered fracture of several ribs on the left side from a severe contusion, from which injury, however, he recovered completely after three months' treatment in the hospital. No history of syphilis. Five months ago lower limbs became œdematous and for the last six weeks ascites was present. He was admitted into the Beaujon Hospital February 27, 1865. At this time the following conditions were noted: Œdema of lower extremities; ascites; breathing difficult and stertorous; bronchitis on left side of chest, and hydrothorax on opposite side. Diaphragm pushed upward. Pulse 100, irregular and intermittent. Diar-

rhœa and loss of appetite. No delirium. Urine contained no albumen. A stimulating treatment was adopted. March 1st the patient died, the pulse having been for a time exceedingly feeble and intermittent. The breathing toward the last was very labored and the patient was unable to lie down.

Autopsy. Pleuritic effusion on left side, bronchitis. Liver small, somewhat contracted, but not cirrhotic. Serous effusion in pericardium; heart dilated, mitral valve insufficient. On opening the abdomen a tumor, the size of a fœtal head, was found in front of and on the same niveau with the left kidney. This tumor was bounded in front by the stomach and the transverse colon, above by the diaphragm, below by the descending colon, behind by the kidney, toward the median line by the pancreas, and on the outside and above by the spleen. The tumor was loosely connected with the kidney and spleen by connective tissue, in which the vessels of these organs could be readily seen. The tumor was evidently connected with the pancreas. The external surface of the tumor was irregular and nodulated, the anterior wall of variable thickness. Fluctuation plain. The vessels of the spleen were intimately connected with the posterior surface and were not easily isolated. On careful dissection the lobules of the pancreas could be separated from the tumor, but the walls of the tumor contained a tissue which resembled glandular structure. On opening the cyst a considerable quantity of dark fluid blood escaped, which contained a number of small, recent coagula. The inner surface of the cyst was uneven and reticulated, resembling the interior of the right ventricle. On the surface of the prominences, diverticula could be seen, which were in free communication with the principal cyst. The wall of the cyst was very much indurated and thickened at four or five places. Some of these nodules were fibro-cartilaginous in structure, while others had undergone calcification.

Sections of the cyst wall showed under the microscope nucleated epithelial cells which resembled in structure the epithelial cells in the pancreas. Acinous groups of glandular tissue were also found. The reticulated structure in the interior of the cyst contained vessels and remnants of the acini. The author came to the final conclusion that the tumor was a cyst, located in the tail of the pancreas. The presence of blood in the cyst was explained by the supposition that, during the progressive dilatation of the cyst, some of the vessels in the connective tissue reticulum had ruptured.

M. Le Dentu, who examined the cyst, also came to the conclusion that the bleeding had taken place into a preëxisting cyst. What symptoms the presence of the tumor had produced during life could not be ascertained, as the patient was being treated for organic disease of the heart and the tumor was not recognized during life.

Case II.—Störck (*Archiv gén. de Paris*, Mai et Juillet, 1836) observed the following case. The patient was attacked during the menstrual period by vomiting, which was followed by coldness of the extremities, palpitation of the heart and dyspnœa. Soon after this time a pulsating tumor was detected in the epigastric region, which caused considerable pain. The patient also suffered from constipation and attacks of vomiting.

She died three and one-half months after the first attack. At the autopsy the entire pancreas was found enormously dilated, and weighed with its contents thirteen and one-half pounds. On cutting into it, it was found filled with coagulated blood. Judging from the condition of the coagula, bleeding had occurred at intervals. The weight of the tumor had caused injurious pressure upon adjacent organs. Le Dentu believed that the hemorrhage was caused by the act of vomiting and had taken place into a preexisting cyst of the pancreas.

Case III.—John Parsons reports a case where hemorrhage into a preexisting cyst proved fatal after the latter had ruptured into the intestinal tract (*British Medical Journal*, 1857). The patient was a female, sixty years of age, who had suffered from vague dyspeptic symptoms for an indefinite length of time. When she was examined by the reporter a fluctuating tumor the size of an orange could be felt in the epigastrium, just below the

greater curvature of the stomach. Emaciation progressed rapidly. The tumor disappeared suddenly, at the same time a viscid, dirty white fluid was discharged through the bowels. The tumor reappeared in a short time, and ruptured a second time into the intestines, followed by hemorrhage into the ruptured cyst which proved fatal. At the autopsy, the pancreas was found excavated into a wide canal which, at either extremity, was dilated into a cyst. The walls of the cysts were of the firmness of cartilage, and the organ was adherent to the stomach, kidney, and colon. Coagulated blood was found in the dilated duct and cysts.

REMARKS.—In Anger's case there is room for speculation concerning the origin of the cyst and the source of hemorrhage. As the cyst had not ruptured and did not remain in communication with the patent pancreatic duct on the proximal side, we can only explain the absence of altered pancreatic juice or at least the absence of cyst contents previous to the occurrence of hemorrhage, by assuming that absorption took place as hemorrhage increased, if we adopt the idea that the bleeding occurred into a cyst which had formed before hemorrhage took place.

Two other explanations might be offered. First, that the parenchymatous hemorrhage produced the cyst, the circumscribed coagulum separating the interstitial tissue, and the lining of this space with endothelial cells developed from the connective tissue cells, and subsequent hemorrhage from the interior of the cyst wall. Again, the hemorrhagic cyst might have originated in a dilatation of one of the vessels of the pancreas, a varicose ectasia of a vessel.

In the second case it appears more than probable that hemorrhage occurred by rupture of a vessel and extravasation of blood into the altered parenchyma of the gland, distending the entire capsule of the organ—in other words, a hæmatoma of the pancreas. In Parson's case the clinical history and the post-mortem appearances prove beyond all doubt that the fatal hemorrhage took place into a preëxisting pancreatic cyst. The immediate cause of hemorrhage in this case was undoubtedly due to inflammatory changes in the interior of the cyst after the first rupture, and to sudden diminution of intracystic pressure by the second rupture.

Diffuse Hemorrhage.

CASE I.—Reported by H. Hodson Rugg (*Lancet*, May, 1850). A man, aged forty-two years, had just recovered from an attack of acute articular rheumatism, when he was attacked suddenly with a severe pain in the left lumbar region. He became collapsed almost instantly. This was followed by cold, clammy sweat and other symptoms of acute anæmia. He never rallied, and died within a few hours. On opening the abdomen after death a large quantity of recently extravasated blood was found between the pancreas and left kidney. A careful search for the source of hemorrhage was made, when it was found that the blood had escaped through an opening of considerable size, which presented the appearance of an ulcer on the anterior surface of the pancreas, which contained a blood-clot of the size of a walnut. Sections

through the pancreas showed a number of small excavations filled with blood, the size of a hazelnut and smaller, which looked like aneurismal dilatations.

CASE II.—Reported by Oppolzer (*Medizinische Neuigkeiten*, April, 1859). The patient suffered from severe pain in the epigastric region, followed by vomiting, which always aggravated the suffering. The vomited matter consisted of mucus and bile. The disease was attended by fever, very frequent pulse, cold extremities. The bowels were constipated. No blood was vomited, and the case was diagnosticated as perforating ulcer of the posterior wall of the stomach. On the third day after admission to the hospital he died. At the autopsy the stomach was found in a healthy condition, but around the pancreas and between the layers of the mesentery a copious effusion of blood was found. The pancreas was the source of hemorrhage. This organ was found enlarged to double its normal size, of dark red color, and on section was found infiltrated with a blood-stained exudation between the acini.

CASE III.—Reported by Hilty (*Correspondenzblatt für Schweizeraerzte*, Nov. 15, 1877). The patient was a mechanic, aged thirty; tall, stout, and muscular, but of intemperate habits. One evening he drank beer to excess, and on the following morning without any premonitory symptoms he was seized suddenly with a painful tension of the abdomen, which gradually increased in intensity. He was sent to the hospital, where, on examination, he was found in a collapsed condition. Extremities cold, forehead covered with a cold, clammy perspiration. All the symptoms indicated acute anæmia. On physical examination nothing abnormal was found, except that the upper part of the abdomen was distended and painful, especially to pressure. Diagnosis of poisoning or gastritis was made, and treatment adopted in accordance with this view. The patient never rallied, and died on the evening of the following day. At the necropsy the omentum and mesentery were found loaded with fat. No abdominal effusion and no trace of peritonitis. The diaphragm was pushed upward as high as the fourth rib. In the connective tissue around the pancreas a copious effusion of blood was found. The pancreas was double its normal size, firm in structure, and of a dark violet color. On section the lobules were seen to be of a dark color, and the interlobular tissue infiltrated with blood; this infiltration was most copious in the head of the organ. The gland duct was normal, but the vein running along the lower border of the pancreas was distended with blood-clots. No other pathological conditions were found which could explain the sudden death.

CASE IV.—Described by Portal (*Traite de l'apoplexie*, Paris, 1811). This is the first case of this kind on record. A merchant had suffered for two years from colicky pain in the abdomen, nausea, and diarrhœa; emaciation appeared early and continued progressively. Twenty days before his death fever made its appearance. The pancreas presented a violet color, was softened, and from its whole surface was exuding a black offensive fluid. Stomach and duodenum showed at some points adjacent to the pancreas evidences of inflammation.

CASE V.—Reported by Haller and Klob (*Wiener Zeitschrift*, N. F., 11, 37, 1859). Patient was a man, sixty-six years of age, who had died after a short illness. The pancreas was found almost completely detached, its only connection with the adjacent organs being a few strings of connective tissue. It was surrounded by a serous fluid. The stomach was perforated from without, and the cells of the pancreas were disintegrated, granular, and changed into detritus, and the splenic vein was filled with a thrombus.

Kollman (*Bayr. ärzt. Intelligenzbl.*, No. 39, 1881) reports two cases of hemorrhage of the pancreas, the first of which came under his own observation, and the second under the care of Gerhard.

CASE VI.—Female suffering from stenosis of mitral valve and pleuritis on left side. One afternoon, after having partaken of a liberal dinner, she had an attack of diarrhœa, but no vomiting. During the night she had a chill,

and an anxious sensation with jactitations. In the morning of the following day she felt greatly improved, but soon after expired suddenly.

Autopsy. Subperitoneal extravasation of blood at the pyloric end of stomach. Mucous membrane of duodenum along the convex side infiltrated with blood, but intact. Pancreas hyperæmic, and surrounded with an extravasation of blood, which was most marked in the retroperitoneal connective tissue, extending to the hilus of the spleen. The tail of the pancreas was more hyperæmic than the remaining portion of the gland, and infiltrated with blood.

CASE VII.—The patient was a female, who, from the symptoms presented, was supposed to suffer from bronchial catarrh, emphysema, ascites, and anasarca. She was suddenly seized with collapse, and died in a few hours. At the necropsy the subperitoneal tissue of the duodenal peritoneum was suffused with blood. Considerable hemorrhage into pancreas, and the retroperitoneal space behind pancreas distended with blood.

REMARKS.—A careful perusal of the above cases must satisfy the most casual observer that the hemorrhage was produced by different causes, and constituted simply an expression of different pathological conditions. In the material presented three distinct, primary, pathological conditions will be recognized: 1. Disease of the bloodvessels of the pancreas; 2. Chronic parenchymatous degeneration of the gland; 3. Acute hemorrhagic pancreatitis.

In Rugg's case the patient had just passed through the stages of acute articular rheumatism, and had not suffered from symptoms referable to organic disease of the pancreas, when he died suddenly from internal hemorrhage, which was traced to the pancreas. The pancreas itself showed no other pathological changes, except circumscribed cavities filled with blood, which are referred to as resembling aneurismal sacs.

Case No. III., reported by Hilty, is an illustration of the second class. Extensive fatty degeneration was found to exist in the tissues generally. Klob found interstitial hemorrhage in the pancreas, in connection with chronic interstitial inflammation of the pancreas, and as a result of prolonged congestion of the portal vein. Zenker reported three cases, which he observed in the course of one year, to the Naturforscher Verein at the Breslau meeting in 1875. In all cases the amount of blood extravasated was slight. His observations on hemorrhagic infiltration of the pancreas as a cause of sudden death are of great importance to the medical and legal profession. Death from this cause takes place more frequently than is generally supposed.

The facts observed by Zenker were nearly the same in all cases. A corpulent subject died suddenly, or was found dead. Post-mortem examination revealed, as the only tangible pathological change, hemorrhagic infiltration of the pancreas and neighboring connective tissue, and advanced fatty degeneration of the pancreas.

Further, there was found in two cases bloody effusion in the duodenum, and in two excessive engorgement of the semilunar ganglion. Zenker

believes that paralysis of the heart, whether directly or indirectly caused, must be regarded as the immediate cause of death in these cases. Diffuse infiltration is more common than circumscribed, showing that the same cause exists throughout the entire gland. The bloody effusion is usually not limited to the capsule of the gland, but infiltrates the adjacent spaces, more especially the retroperitoneal connective tissue. The gland is softened, the anterior serous covering disorganized, and the extravasated blood escapes into the bursa omentalis. These conditions are followed rapidly by death, so that even the peritoneum does not show any secondary changes.

In the last class of cases, where the hemorrhage occurs as a symptom of a peculiar and exceedingly malignant form of inflammation of the pancreas, we have reason to believe that the cause of the inflammation is due to the presence of a specific form of infection. Klebs believes that in these cases the corroding qualities of the pancreatic secretion may induce the destructive process. Reasoning from analogy, it is, however, probable that the immediate and essential cause is to be found in some form of microbic infection.

The last two cases illustrate that prolonged congestion of the abdominal organs from obstruction to the return of venous blood, may act as an exciting cause in producing parenchymatous hemorrhage into the pancreas altered by antecedent pathological conditions.

The premonitory symptoms which precede the hemorrhage are referable to the particular kind of tissue changes in the pancreas which predispose to rupture of the bloodvessels. In all instances of pathological hemorrhage we have the usual train of symptoms which point to the textural changes in the pancreas as the seat of lesion. Loss of appetite, nausea, vomiting, epigastric pain, constipation, and debility are the most prominent symptoms in cases of degeneration of the pancreas. When the hemorrhage takes place in the course of an infective, hemorrhagic pancreatitis, we have a complexus of symptoms indicating the presence of an acute inflammation of the organ, usually attended by a rise in temperature. In some cases the hemorrhage produces death so rapidly, that the symptoms which attend this occurrence are of such short duration, that it has been impossible to determine them by actual observation. When the patient dies from loss of blood, the accident is announced by the well-marked symptoms indicative of external hemorrhage: a sharp pain in the region of the pancreas, followed almost immediately by collapse, cold extremities, absence of pulse, cold, clammy perspiration, and a speedy death. If hemorrhage takes place into a pre-existing cyst, the presence of which has been previously determined, the accident may be suspected if pain is suddenly increased, the tumor

becomes larger and more tense, and more particularly if the patient's condition indicates a sudden increase of anæmia. Physical examination can be of value only if hemorrhage occurs into a preëxisting cyst of considerable size, or if the effusion of blood is sufficiently copious to give rise to an appreciable swelling in the immediate vicinity of the pancreas.

The propriety of surgical treatment of pathological hemorrhage of the pancreas can only be entertained when the accident takes place in consequence of circumscribed, benign, pathological conditions which in themselves do not jeopardize the life of the patient, and which admit of measures for arresting hemorrhage by direct treatment. Operative interference should, therefore, be limited to the class of cases described under the head of hemorrhagic cysts of the pancreas. In well-defined cases belonging to this group, it would be justifiable to resort to abdominal section as the only means of arresting fatal hemorrhage, by direct ligation of the bleeding points, or by removing such localized portions of diseased tissue from which the hemorrhage has taken place.

For instance in Case I., partial excision of the pancreas in which the ectatic vessel had ruptured, would have definitely arrested the hemorrhage without interfering with the physiological function of the remaining portion of the gland. When profuse hemorrhage takes place into a preëxisting cyst of the pancreas, further hemorrhage can be effectually arrested by establishing an external pancreatic fistula of large size, plugging the interior of the cyst with iodoform cotton, and applying firm elastic compression of the abdomen with a rubber-webbing bandage over the antiseptic dressing. If this procedure should fail to arrest the hemorrhage, the abdominal incision should be enlarged and an attempt made to extirpate the cyst with or without resection of that portion of the pancreas from which the cyst has grown, according to the size or location of the cyst.

In diffuse hemorrhage of the pancreas due to localized lesion, the same treatment is applicable as advised in the treatment of hemorrhagic cysts of the pancreas.

(To be concluded.)

CASTRATION IN MENTAL AND NERVOUS DISEASES.

A Symposium

BY

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CASTRATION, in the wide sense of the word, both of the male and female, has an import which attaches to no other surgical operation. It not only puts in jeopardy the life of the individual on whom it is performed, but it involves the certainty of the non-production of the whole series of beings that might result from man's obedience to the first command of his Creator, "Be fruitful and multiply." Its potential fatality, as regards the subject of it, sinks into insignificance when compared with the absolute extinguishment of one line of the species. Hence its gravity among moralists, and the severity with which it has been visited by legislators. Death and penal servitude for life, without remission, are the punishments set by some codes upon the crime of unjustifiable castration; which term is made to include all mutilations that may put an end to the virility or fecundity of the victim.

The duties of a surgeon often lead him near the confines of what is illegal. With the deceptive plausibilities of patients, their indefinite notions of morality, and his own propensity to action, induced by sympathy with distress, the balance of prudence is sometimes apt to waver in uncertain hands. One is thus brought to see how indispensable strict ethical training is as the complement of technical education, how needed is a check upon the impulses of acquired or reputed manual dexterity, how, in reference to laparotomy operations in general, the profession should be made to feel that it is acting under the restrictive influence of the opinions and decisions of its wisest and most vigilant leaders, and how urgent it is that those leaders should rise to the level of their dignities and responsibilities.

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The advances made in abdominal surgery within the last five and forty years are, to those who have passed a long life in practice, who have been sharers in the work done, and who have found time to look about them and note what their contemporaries have undertaken, something astounding. Men of to-day, launched upon the full flood, have little idea of how the rush of accumulated experience which carries them along has been made up; or of the struggles and perplexities those who were the first to move had in paddling and steering through the swamps of difficulties, and in face of the blasts of prejudice. Progress was slow and there was time for reflection. It is not to be wondered at that such reflection sometimes caused hesitation and yielding before obstacles. Cooper, Lawrence, Green, Brodie were great surgeons. They did and taught surgery that was the boast and honor of their day. But they were orthodox men; they reverenced authority, and were authorities themselves. A pause for inquiry as to what was going on, and where it would lead to, was, at their suggestion, not dishonorable and did good service. It helped to enlighten and liberalize them, and it moderated the contagious impetuosity of the new adventurers. It would not be unwise if we made a halt now, and took account of our position in regard to some points that are pressing and open to question. We may be among the last to stand in the way of clear-sighted attempts to move onward, but wish always to be guided, and to see others guide themselves, with caution and in the light of reason.

This is not the place to go into the history of ovariotomy. But it may be well to recall some points in it connected with the subject before us. In its early days the operation was looked upon as a personal enterprise, to be taken up every now and then by men of the Livingstone, Brunell, or Columbus type, who were either vaguely enthusiastic, stimulated by an impulse for out-of-the-way performances, or so wise and so far ahead of their times that few could understand them; and fewer still were inclined to follow an example which, though it might meet with a certain amount of success, excited astonishment and suspicion more than admiration, and brought little other reward than the consciousness of having made honest efforts to rescue suffering women from impending death. Then came a time when things were different. The profession took up the matter seriously and practically. It was still an assault upon unsolved problems. But the contention ended in the opening up and annexation of the "whole domain of peritoneal surgery." It was like the discovery of the Californian diggings or the African diamond fields. The way was cleared for all prospectors, and the benefits spread world-wide. Between the years 1840 and 1865 the excision of ovarian tumors came to be accepted as a sound piece of surgery, as admissible among the arts "*quæ prosunt omnibus*" as lithot-

omy, and more promising in its results than most other capital operations. It became naturalized in England, was taught in the schools, and soon threw out an abounding crop of controversial and didactic literature.

But there was a reverse to this bright side of things. Inexperience, rashness, maladroitness threatened danger. I saw then for ovariotomy, as we now see for laparotomy, a disposition to wild, irreflective meddling. In my book, published in 1865, I seem to have anticipated something similar to the present folly, though not nearly to the extent it has now gone. Here is what I say in the preface: "I cannot send forth this volume without a word of caution. A discovery which has triumphed over opposition of all kinds, honest and scientific, prejudiced and ignorant, may still be ruined by the support of rash, inconsistent, thoughtless partisans, whose failures do not reflect so much discredit on themselves as on the operation they have badly performed in unsuitable cases. Indications are not wanting that ovariotomy has entered on this phase of progress, and there is reason to fear that judicious men may be influenced by the outcry of the foolish, and that a triumph of British surgery, which has been won by such great labor and care, may be arrested before it is complete—may even be converted into temporary defeat—by the indiscriminate support of zealous but injudicious advocates." We are not wrong in assuming that such warnings—for mine did not stand alone—were not useless. More discrimination was shown in the selection of cases, diagnosis was more scrutinizing, operators fitted themselves better for the work by reading and observation, and both unsuccessful operations and incompleted attempts became less frequent.

But ovariotomy was not only viable and strong. It had in it an unsurmised power of fecundity which we can now estimate by the many prefixes to its terminal dissyllable. Before the present reign, the art of midwifery was somewhat in the shade. The needs of royal maternity gave it the prestige which was wanting to its utility. Knightly spurs and hereditary rank were won in the palace chambers. The title was a little incongruous with the old familiar term midwife. The synonymous accoucheur came into vogue, but it did not accommodate itself to the linguistic requirements of professors and writers, and was objectionable as being imperfectly euphemistic and too directly artistic. Something with a more scientific twang was the desideratum, and obstetrician seemed for a while to be all that could be hoped for by those who were ambitious of showing that they could propound doctrines as well as handle forceps. Yet women, whether in the hands of Shandean Slops, or Caxtonian Squills, are not always as they should be, either before or after the great obstetrical event. They have maladies before, meet with

accidents at the time, and often suffer consequences which require surgical skill for their cure. Some could split a perineum, but it was not every one who could put it right again, and obstetricians soon began to foster a competition for secondary specialties, to indulge in the creation of Greek compounds, and were not long in fitting themselves with the distinguishing appellative of gynecologists. Gynecological societies were the inevitable complement of this sectarianism, and in their proceedings we find all their speculations and manipulations so put in evidence that we can leisurely watch and criticise them in their budding, blooming, and fruition.

The growth of specialization in medical science is at the same time a benefit and a peril. It is well to know that men of broad culture, capable of linking each small and special area of research to, and viewing it in the light of the vaster realm in which it is an essential and inalienable factor, devote themselves to particular investigations. And if special gatherings were schools of instruction by masters, instead of theatres, with rapidly recurring exhibitions of curiosities and recitals of marvels, which must be made forthcoming by some means at the appointed time, we could appreciate them. There is a wide difference between one man acting and ruling as a specialist, and a miscellaneous lot of men grouping themselves together and each pushing to the front as a society of specialists. The master of a pack of hounds must be a specialist in his way, but it would be absurd to suppose that every rider in the field would be able to take his place, or any other than that of a follower. But herein is the danger with groups of gynecologists. It would not answer for all to run on in the same track. To be anything, each must hunt up his own little therapeutical quarry and keep to it. Groping among details is an absorbing and paralyzing occupation, and soon the curve of a pessary or the lining of a speculum fills the field of vision, and great principles are lost sight of. With one such idea kept steadily running in the same groove, a man may quickly find his way down to the lowest level of routine womb-scaffolding or singeing. And so it is that while out of the multitude of gynecologists a few inspired with Hunter's idea "all discord, harmony not understood," are spending their lives in the higher regions of speculative inquiry, thinking, developing ideas, multiplying original principles, and applying them to the pathological phenomena peculiar to the female sex—with a special view to the elucidation of their causes, mode of origin, and prevention—the rest are dispersing themselves over the lower ground of therapeutical action. Disease exists, the how and the why concern them not. Why search into the inscrutable? If the faults and follies of mankind engender excisable matter, their business is with the palpable, and to get rid of it. So myomotomy follows ovariotomy, Porro supplants the

Cæsarean, Battey breaks through his difficulties with "normal oöphorectomy," and the *Moutons de Panurge* are soon seen flocking over his gap. It is with this castration that we have to deal.

It is about fourteen years since the operation of normal ovariotomy, as Battey called it, was brought practically before the profession. It is now impossible to ascertain how often, or by how many surgeons, it has been done. But the most recent bibliography of the subject extends to about five octavo pages, and comprises the names of more than one hundred and fifty writers. The greater part of these publications consist of the accounts of cases and the discussion of points of practice. Some of the matter is critical, much of it defensive and exculpatory. So that it has both a history and a literature.

The operation itself is in no sense a novelty. It has been practised in all times, though not for surgical reasons. In the last century, about the same time, L'Aumonier and Pott did it remedially; the first, without premeditation in the course of opening an abscess in the iliac region. Pott, however, intentionally took away two ovaries which formed inguinal hernias. Though Blundell never did the operation, it would be unjust to omit all reference to his so often cited prophetic suggestion, made before the Medico-Chirurgical Society, in 1823. Lassus, in 1858, and two German writers, mention some other cases similar to that of Pott. In 1869, Kœberlé, while putting a ligature on the broad ligament for the relief of a retroverted uterus, took away an ovary which embarrassed his proceedings. Esmarch, too, a little while later, removed both ovaries from a young woman who had congenital atrophy of the vagina. The monthly sufferings were so great that each time her contortions forced the ovaries through the inguinal openings. They were the point of departure of all the neuralgic radiations, and Esmarch cut them away as a dentist would draw a troublesome tooth, without theorizing about the suppression of function and anticipated climacteric. He simply did a perfect castration and left the titular honors of normal ovariotomy, or oöphorectomy as it was soon after called, to Battey, and to Hegar, who began to use the phrase "castration of women."

These two surgeons, in July and August, 1872, within twenty days of each other, did the operation of castration by the abdominal section. One was at Fribourg, the other at Rome, in Georgia. Of course, they knew nothing of each other's reasonings and actions. Both their patients were in much the same condition, with menstrual neuralgia. Hegar's patient died of septicæmia, and he held his hand for four long years. Battey had a better chance. His patient got well and was quit of her troubles. Elated by the success of his operation, he hastened to make known what he had done by a notice in the *Atlanta Medical and Surgical Journal*, the September following, and six months after-

ward gave all the details of his performance, and defended his theory, before the Medical Society of Georgia. Both men had the same idea, or nearly so. Esmarch's object was nothing more than the removal of the organs that were the seat or the cause of pain in his patient. It was a question of function and constitutional effects with the two pathologists. Hegar, from the first, explicitly stated that what he hoped to do by castration was to bring about a suppression of the ovarian function, a cessation of the periodical and intermittent influence of the ovaries on the whole system, and an early declaration of the menopause. Whether Battey went as far and was as clear in his conception of the import of the proposal has been doubted. He had taken a long time—six years—to deliberate and to consult about it, and met with nothing but indifference and disapproval. His arguments brought no one over to side with him. It was said that his idea was merely that of calming down pelvic disturbance, without calculating upon further consequences; but he distinctly mentions that he expected a "change of life" to follow the castration. If he did not argue out the matter, and expound his doctrine, with German elaborateness, we may at least admit that he knew what he was about and had considered what was likely to happen. At any rate, he thought out his subject carefully, acted independently, and was the first known to do so. He was prudent, waited patiently, and watched assiduously for a fair occasion to put his proposal to the test, and at last succeeded in showing it to be logical, rational, and effectual in practice. If his arguments had made few converts to his opinions, his practice was soon adopted by followers, and he is entitled to the credit of originality.

Up to this time we had heard only of menstrual difficulties as a motive for oöphorectomy. The ovaries were treated as confirmed and convicted culprits. Battey seems to have spent as much as six years in reformatory efforts with his first case. It was only when all looked utterly hopeless and incorrigible that the extreme penalty was resolved on and carried out. It was a sorry alternative, and not one to boast of. When a surgeon is obliged not only to put on the black cap but to become the executioner, the only redeeming point in the business is the skill he may display in carrying out the sentence. The blot is the necessity for such a measure. As society is wanting in reference to crime, so the profession is wanting in reference to disease. There is too much law, and not enough gospel; too much doctoring and not enough philosophic pathology. It might be otherwise. With better principles and training we should see less of crime and its consequences. With a keener estimate of the higher functions of medicine, more thinking, more research and systematic dialectical reasoning, there would be more defiance of disease, more life-giving power, and less of surgery. But we

are not yet at this point, and dysmenorrhœal invalids may in the meantime be thankful that there are still some oöphorectomists as considerate and merciful as Battey.

The year 1872 was remarkable in that, within a month of each other, three oöphorectomies were done by three different surgeons, in three different countries, without either of the three being aware of what the others were about. We have noticed the operations of Battey and Hegar. On the first of August, a few days after Hegar's operation, Tait, of Birmingham, is reported to have also removed two ovaries from a woman who was sinking from irrepressible hemorrhages due to uterine enlargement or tumor. She recovered and was better two years afterward. In the course of the next year it is also recorded that he did three more similar operations. In two of the cases he took away only one ovary. That was imperfect castration—not the complete operation of Hegar. The want of appreciation of Hegar's motive for the operation is evident. Of a large proportion of Battey's early operations, the same defect is also apparent in the tables. It would seem that he too had failed, from some unexplained reason, in fidelity to the principle upon which all rests.

Gillmore and Pallen, Americans, did the bilateral operation in December, 1872, with success. In the next four years many other names came upon the lists, as Peaslee, Trenholme, Goodell, Sims, Thomas. These for the most part followed Battey's example, and at the beginning operated on patients with ovarian neuralgia and general nervous symptoms, or with some congenital imperfections interfering with menstruation.

Then, in 1876, Trenholme did as Hegar and Tait had done, and used the operation for hemorrhage, depending upon uterine fibroids. Later on, operators found all sorts of pretexts for operating. Too many of their operations were imperfect. Of eleven operations done by Sims, between February, 1875, and August, 1881, six were unilateral. Nor was the mode of operating determined; some choosing to do the removal by the vagina, others by the abdominal section. At length, in 1881, Battey, deploring the abuse of his operation, when at the International Congress held in London, felt himself constrained to renew his protest, and record the fact that up to that date he had met with only fifteen cases in which he could see reason for carrying out the practice.

It was not until 1876 that Hegar, in Germany, recommenced operating. In August of that year, he removed the ovaries from two women who had hemorrhagic fibroids. Both were saved and benefited. Kaltenbach then, in the following October, operated under the same conditions, but his patient died. Nussbaum had a success the same year. Between that time and 1879, Martin, Freund, Fehling, and Tauffer

castrated several women, mostly for fibroids that could not be otherwise treated. The idea in Germany was that as Hegar pointed out; this was the most legitimate use of the operation. Tauffer and Langenbuch thought the practice might be extended, and operated in some instances in which the dysmenorrhœa and other symptoms were manifestly of ovarian origin. But upon the whole the influence of Hegar's doctrines prevailed, and no such outburst as took place in America was seen in Germany. The reports of Wiedow, at Fribourg and Copenhagen, show how important have been the amount and success of oöphorectomy in uterine cases among the Germans. In Switzerland Bischoff, Bircher, and Müller took up Battey's notions and practice without hesitation. Since 1880 the operation has been accepted in Spain and Italy.

It is not the first time it has been said that there are some things which the French manage better than we do. And certainly in some gynecological matters it has been so. The logical faculty is strong in Frenchmen. It would almost seem that their women are not to the same extent as others liable to pelvic troubles. The subject of oöphorectomy had become repulsive from the fanaticism in America, and perplexing from some of the English revelations. Batteyism was on its trial and undergoing a process of classification. There was time to wait. *Fiat experimentum*—they could be content for a time with observations and reports. So things went on till 1880, when convinced of the rightness of the principle, and that the operation in the hands of judicious men was being turned to useful account, Professor Duplay operated in a case of fibroma, taking away both ovaries. His second operation was in 1884. Péan began in 1882 and has altogether reported eight operations. Three of his cases had congenital absence of uterus and vagina. The five others were neuralgic. Though, in general, abdominal sections are not popular among French surgeons, they are now carefully choosing their cases for oöphorectomy. The usages of French surgical practice render an epidemic of laparotomy very unlikely.

The operation was not at first well received in England. Tait, of Birmingham, has been identified with it from the beginning. He has modified it and extended its application. Many others have followed in his steps; some have tried to outstrip him. The ovaries and all their appendages now go the same way; and the meshes of the physical, mental, and moral network of reasons why the operation should be done are so closely woven that few cases of a perplexing nature, that can anyhow be connected with the generative organs or functions, have a chance of escaping laparotomy or something more. The present state of oöphorectomy in England proves how fully justified I was in writing as I did in 1882, and shows how little my warning has been attended to. I said then, and I have not a word to retract now: "Though I accept

the principle, I see that the operation has a very limited application, and is so open to abuse that its introduction in mental and neurotic cases is only to be thought of, after long trials of other tentative measures, and the deliberate sanction of experienced practitioners. . . . . Except in cases where bleeding fibroids may call for the extirpation of the healthy ovaries, we might at least require some evidence of the ovaries being diseased before consenting to their extirpation in the hope of curing any of those vague nervous disorders to which women are so subject, which are often dispelled by moral treatment or social changes, often benefited by measures which can have but little effect except on the imagination, often return after cure in any way, and leave the hopeless beings the prey of unscrupulous or illogically enthusiastic experimenters."

The danger is now increasing as the operation is becoming world-wide. The oöphorectomists of civilization touch hands with the aboriginal spayers of New Zealand. The ovary, is in fact, the nucleus of gynecological science and the source of gynecological practice. Its products give occupation to the obstetrical art. The disturbances it sets up in the system at large are the prairie grounds of its proletarians. The morbid structural changes, displacements, and accidents of it and its appendages are the arena of its operators. Wonderful, indeed, is the hydra-like tolerance of women of sections and mutilations under their hands!

But the ovary is more than this. Reproduction is the dominant function of woman's life, and all her other living actions are but contributory. Physiologically and pathologically, the generative organs have peculiarities of which the surgeon must take account. They are not vital organs. The purpose they serve is more in relation with the species than the individual. Their life of functional activity is not of the same extent as that of the being of which they form part. The bodily health is none the worse, perhaps better, during the time of their quiescence. Disease is exceptional in them before puberty. The time of their activity is the time when they are most often attacked by disease. The origin of diseases in them which prove fatal after the change of life, may almost always be dated back to the middle period. They affect both the physical and mental powers and qualities during the time they are in development and full play; not much before or after. The tubes, womb, and vagina are accessories more or less essential. The ovary may exist without them; but it is seldom that the tubes, womb, and vagina are fully formed in the absence of ovaries. There may be an evolution of ova when the appendages are no longer there or are even cancerous. When the ovaries are diseased or removed function stops, and the other parts shrink up. None of the subordinate parts of the

passages can do what the ovary does, but the tubes may supplant the uterus as the seat of gestation, and the uterus, except during pregnancy, acts chiefly as a section of the tube. In infancy and old age its cavity is contracted and approaches nearer the form of the tube. There is a fact, too, which should never be neglected by the surgeon in coming to a decision about the operation of excision, especially in cases where the indications are not positive—to wit, that the ovaries are not such isolated organs, nor so invariable in their number, as is generally supposed. There, as elsewhere, is shown the tendency to revert to lower types of development; and patches of ova-bearing tissue may exist in adjacent peritoneal folds. These may be beyond the ligature of the pedicle; and, if left, keep up the sexual impressions and power of periodical ovulation. Liégois mentions this subject in his *Physiologie appliquée à la Médecine et à la Chirurgie*, of the date 1869. Waldeyer found a piece of ovarian tissue in the pedicle of a tumor after having, as he thought, finished an ovariotomy. Weigel counted, out of six hundred women examined, no less than twenty-three with more than the ordinary two ovaries. Instances of regular menstruation, and even of pregnancy, after double ovariotomy, have been met with sufficiently often to show how easy it is for the expectations of a surgeon to be thwarted by a condition which he can neither foretell nor determine exactly at the time of his operation.

The fact that women remain for some five-and-thirty or forty years with a certain part of their organization in a state of periodical excitement, ready for the special act of childbearing, would lead *à priori* to the supposition that the whole of that organization must in some way or other show the effects of it. And such is the case. At an early age females are more tenacious of life, and the mortality of boys is greater than that of girls. During the procreative period the excess is on the side of the females, independently of the mishaps of childbirth. After the climacteric, male deaths are in greater proportion. The disproportion in the number of the two sexes in the living population would be still more marked than it is, were it not for the casualties and diseases connected with maternity. There is a constitutional difference between the sexes at all times; but during the time when women are essentially females, they have more sensibility and excitability, a more lax and delicate fibre, with a strong tendency to nervous affections and diseases of an asthenic character. The development of puberty produces one set of disorders, usually anæmic; ovulation, parturition, and lactation give rise to another class; while nervous anomalies and degenerations of tissues mark the decline of the functions and the torpidity of the organs of generation.

So far as regards the many diseases, the relief of which by castration

has been either proved or postulated, we may virtually put children out of the question. They may occasionally require ovariotomy, but with that at present we have nothing to do. In one of the most recently published tables of oöphorectomies, the earliest age among the patients operated on for hemorrhagic myoma was eighteen, for ovarian neuralgia and hysteria seventeen, and she was none the better for it, and the youngest on the malformation list was eighteen.

Péan once castrated for epileptic symptoms with mental disorder at the age of 45, with no good result, and this is the most advanced age mentioned in the table of nervous patients. The age next below that was 40. 52 is the extreme age in the table of uterine cases, and the patient died some months afterward of cancer. It would thus seem that in all the older patients who submit to abdominal section, it is ovariotomy for cystic or other enlargement of the ovary that is done. Out of 171 cases undergoing the operation for hemorrhagic uterine fibroids, 53 were between 30 and 40 years of age, 62 between 40 and 50, and only 9 below 30. The number of cases of oöphorectomy for other causes is comparatively small, and few of them outside the middle age. The limits of our investigation of the diseases requiring oöphorectomy are thus drawn in within the narrow compass of the 20 years of woman's life between the ages of 30 and 50. The find here cannot, in the common run of things, be very rich except for fibroids. If the apostle of the doctrine could accept only 15 cases as fit for the operation in the space of ten years, we may assume that, in any great advance upon that proportion, there must be either some self-deception or some want of judgment.

During the twenty years just named, the most common disease to which women are subject, connected with the organs of generation, is an abnormal development of the uterine muscular or fibroid tissue, either interstitial, or projecting from one or other of the uterine surfaces. Such tumors occasion discomfort often so great as to incapacitate for social life. They are impediments to childbearing. They give rise to a variety of reflex nervous symptoms, sometimes almost insupportable. They may cause ascites or set up acute or chronic peritonitis, and dangerous hemorrhages are a notable consequence. Occasionally their pressure on the large vessels, nerves, lymphatics, ureters, rectum, and bladder has been fatal. And Roehrig declares that, among the cases bad enough to resort to Kreuznach, there has been a direct mortality of 11.4 per cent.

A disease against which stands such a formidable array of accusations calls for all the resources of science to remedy it. Although many women suffer less than can be easily explained, it must be the misery and ruin of a long series of existences. Medical treatment does not

count for much. The results of myomotomy are deplorable even now. And the operation, when not fatal, has often been incomplete. The tumors have, as it were, a sort of gregarious habit, and the patient is left liable to a relapse to her former state, either from the growth of those abandoned, or from new formations. Many writers have maintained that one out of every five or six women has uterine fibroids of some kind, large or small, unheeded or troublesome. Fortunately, if it be so, the greater part of them have only a transient existence. The numbers that turn up in a state of degenerescence or transformation in the autopsies of old women show that they have a tendency to shrink up, or become innocuous, if there be a survival of the menopause.

Based on this fact, castration, as compared with myomotomy, presents us with the striking contrast of a mortality of only 14.6 per cent., a diminution of the tumors, a stoppage of the hemorrhages and a disappearance of many of the accompanying symptoms. Moreover, as half this mortality has been due to septicæmia, there is here a wide field for surgical enterprise.

But the uterus is only a section of the ovarian outlet, destined for the temporary sojourn of the embryo. We have not exactly determined what are the influences on the constitution of the natural functions, and do not know much of the pathology of the strictly efferent part of the tubes—the oviducts or the Fallopian tubes. Sometimes they usurp the incubatory office. Then, no doubt, as death is otherwise mostly inevitable, the best thing to do is to extirpate them as soon as we can be assured that their condition is menacing life. But latterly they have had as sorry a time of it as the London dogs. They are erectile structures and blushed at the touch of the abdominal explorer. A cry was raised against them as subject to congestions, dropsies, constipations, purulencies, hemorrhages, neuralgias, and as the propagators of all sorts of psychical aberrations. Then followed a savage raid, and every hypogastric malaise incurred an exploration or a sacrifice. As with other tubes, the inlet, passage, and outlet are not always as free as they should be, and the contents are not always normal. Irritated themselves, they cause irritation elsewhere. As much may be said of and against similar things in the male. But would anyone strip off the penis for a stricture or a gonorrhœa, or castrate a man because he had a hydrocele, or was a moral delinquent. It is better to be candid and patient, say we know but little, strive to learn more, and in the meantime abstain from doing mischief. Who can diagnosticate with certainty the presence of irreparable disease in these out-of-the-way organs. An exploratory incision is an avowal of ignorance, and too often the expedient of impatience. How far is it justifiable as a means of diagnosis in diseases short of fatal, where there is time to wait?

A case of congenital malformation, with what is now sometimes called

obstructive dysmenorrhœa, ending fatally, under his care about the year 1866, was the inspiring cause of Battey's reasoning on the subject of the extirpation of the ovaries as a remedial measure. Gilmore was the first to put his conclusions to the test in reference to this particular point. Peaslee followed in 1876, and Battey in 1877. Battey had the satisfaction of a good result. So too it was with Gilmore's case. Since then the operation has been done for the same or similar reasons, so far as we can judge from the small numbers, with a mortality of about fifteen per cent. In this category of cases we may place obstructions to the menstrual functions acquired in severe labors, by accidents, by gynecological attempts at surgery, or occasioned by pelvic distortions, flexions, and displacements of the uterus. They are, after all, not very common, and oöphorectomy, as a means of getting rid of the difficulty, is less dangerous and more certain than the other operations done to relieve or gratify the patients.

The ovaries themselves are often the seat of pain, and the cause of acute neuralgia and hysterical symptoms. The attacks occur with the periodical excitement of the organ. Every now and then such symptoms show their connection with it by being the accompaniment to impregnation, and to some women the proof of conception. They often attend the early stage of growth of cystic disease. Repeatedly, a cessation of the attacks of pain has followed the operation of excision. This was the result in three out of four operations that I have performed. Cause, effect, and remedy are here plainly demonstrated. As to my two other operations, in one it was probable that the benefit was as much owing to the reposition of a thickened and retroflexed uterus as to the taking away of one of the ovaries, the other being in such a state of atrophy that it had no outlines, and was inert. In my fifth case the two ovaries had been amputated by surgeons of renown in Holland, at different times, without permanent benefit. At my operation there was no trace of another ovary, and what I did was to separate part of the omentum and a coil of small intestine from the uterus to which they were attached, and to divide another piece of omentum which adhered to both the fundus uteri and the cicatrix in the abdominal wall. Here the two castrations did no good. The liberation of abnormal connections near the seat of pain did what was wanted, and must be regarded as something more than the completion of the two oöphorectomies. All these cases had been discussed at repeated consultations among a number of experts; nothing was overlooked in the way of palliation, and no decision was taken without unbiassed deliberation. Even this small experience shows how this subject of operation for nervous dysmenorrhœa is surrounded with difficulties both of diagnosis and prognosis. In looking at the vast multitude of patients who come under professional notice, with a medley

of nervous or mental symptoms so tantalizing by their refractoriness and their inexplicability, we can understand how it is that many hasty, impressionable practitioners, exasperated by their fallibility, infatuated with novelty, enticed by example, and eager for local notoriety, have yielded to temptation, have risked numberless abdominal sections in the hope that chance would favor them, and so have helped to prove how strong is the contagion of folly.

When one recollects how many such cases undergo an unaccountable spontaneous cure, how often the symptoms cease after some mental impression or physical shock, or a perseverance in some extraordinary position, how many fruitful but painful ovaries have been saved by Dr. Weir Mitchell's systematic treatment, and how often it has happened that a threatened, simulated, or imperfect operation has been enough to frighten or charm away all acquaintance with suffering, doubt falls upon both the asserted necessity and the reputed success of the operation itself. It can never be determined how much is due to the amputation, how much is a psychical phenomenon. How many women have been doomed to sterility that would have been equally relieved by a farce or a failure, can never be made out. But it is a query which takes the gloss off a mass of statistics.

Still we do not pretend to say that cases of nervous dysmenorrhœa, with neuralgic hysterical symptoms, are not occasionally to be met with in which medication fails, and for which there is no other alternative than operation or endurance. But we maintain with Battey, Duncan, and many other wise and prudent men, that such patients are comparatively few and far between. And it is only when one hears such well-authenticated, revolting stories as that of a young lady who, in good health, leaves her home, goes to London or some provincial town, happens to have a trifling indisposition, consults ——, who, troubling himself only to draw out the avowal that her periods were accompanied with "*quelque malaise*," on the spot insists upon oöphorectomy, and a few days afterward does it, that the mystery of some recent statistics is unveiled. Fortunately, she lived to return and tell what had passed. If she had died, what ought to have been the verdict? Have early or later warnings been illtimed or impertinent?

No one can pique himself upon the outcome of oöphorectomy for mental alienation. A few melancholy girls, worn out by long suffering, and driven to think of the river by disappointment at the abortiveness of doctoring, may have laughed and found life tolerable afterward; for women are not morally affected by castration in the same way as eunuchs. But pure madness—no; gynecologists will never empty the lunatic asylums. They have sent some women into them. Madhouse dissections show generally only good or atrophied ovaries, and scarcely in any real ovariotomy cases have the patients been mad.

The pleasantries of men we do not care to name, who talk of freeing the world from the mad and the bad, only point to the extinction of the human race and the self-castration of the last man—for he who cuts mad people must himself be mad. And as for nymphomania, one operator put his own person in danger when he counselled so inconsequently. He must have known that passion in women mocks at oöphorectomy, and his illogical reasoning condemned his judgment. Call a spade a spade, and what would such oöphorectomists be?

The erotic fury and bad habits which mark the ill-regulated mind are matters more for the consideration of the moralist than the surgeon. Parents, tutors, and the clergy ought to be the guides and protectors of youth. The profession can only act by instructing them. No one has more wisely handled this subject than Wheelhouse, the worthy consultant of Leeds, nor can any one do better than recommend his pamphlets and quote the concluding sentences of one of them:

"If medical men will teach parents the true nature of the dangers to which, when they leave their fostering care, their children will be exposed—

"If parents, acting on the knowledge thus imparted to them, will conscientiously fulfil their duty to their children—

"If those to whom the education of the young is entrusted will see that ignorance is displaced in favor of wholesome knowledge—and that, as far as possible, purity of mind, as well as intellectual culture, are the objects at which they should aim, then I think all else will rest with the clergy—and that they, by their positive teaching of the essential holiness of God, with the perfect, spotless character of Christ, as the revelation of the pure nature of the Deity—and as the measure of our own high calling, may rightly be left to inculcate these as the strongest of all moral antiseptics."

The following are the conclusions that may be drawn from the facts at command:

That the operation of oöphorectomy, or the removal of normal ovaries, is one which may be advised in some cases of uterine fibroids, and in uncontrollable uterine hemorrhages.

That it is to be resorted to in certain malformations of the genital organs, deformities of the pelvis, and accidental obstructions of the vagina.

That the right to use it is very limited in cases of ovarian dysmenorrhœa or neuralgia, and only when they have resisted all treatment, and life or reason is endangered.

That in nearly all cases of nervous excitement and madness it is inadmissible.

That it should never be done without the consent of a sane patient, to whom its consequences have been explained.

That the excision of morbid ovaries and appendages should be dis-

tinguished from oöphorectomy, and ought not to be done without the authority of consultation, as in most other cases of abdominal section.

That in nymphomania and mental diseases it is, to say the least, unjustifiable.

Professional reputation is a sacred trust. Generations have handed down that of physic unsullied. To maintain it is with us a personal obligation, and our individual responsibility is now greater than ever. There is so little scope for concerted action in medicine, that the popular estimate of it must be an *ex pede* estimate. Medicine has none of the symbolical trappings of state authority or of celestial inspiration which tell upon the fears and superstition of the people. It is hope that makes them seek and cling to it as their first refuge in time of trouble. It is with them, in their homes, their guide and comforter. People pay little heed to presidents and rectors. The village doctor represents the profession to them, and each in his little circle is high priest and chancellor. By his skill and conduct the whole faculty is judged. He is like one of the fragments in a mosaic. If he is unsound, goes wrong, fails in fidelity to the *lex non scripta* of his class, he falls from his place, leaves a blot which all can see, and the whole composition is marred. In the exercise of his profession each member is so independent, while all are so linked together in honor and duty, that, as sentinels, we have a mutual interest in keeping watch and ward over each other's loyalty, and sounding an alarm in case of default. Of late, the laparotomy epidemic has called for one of these challenges. It has roused a feeling not of jealousy, but of suspicion and concern for professional honor. When men in clubs begin to jeer at gynecological domiciliary fussiness, and husbands are furious at the rumors of mysterious diseases, unknown to Sydenham and Cullen, being rife among their wives and daughters, there must be something wrong. It is time to look into the matter. If we hold the mirror up to nature, only changing the sex of the actors, the spectacle is not flattering. Fancy the reflected picture of a coterie of the Marthas of the profession in conclave, promulgating the doctrine that most of the unmanageable maladies of men were to be traced to some morbid change in their genitals, founding societies for the discussion of them and hospitals for the cure of them, one of them sitting in her consultation chair, with her little stove by her side and her irons all hot, searing every man as he passed before her; another gravely proposing to bring on the millenium by snuffing out the reproductive powers of all fools, lunatics, and criminals; a third getting up and declaring that she found, at least, seven or eight of every ten men in her wards with some condition of his appendages which would prove to be incurable without surgical treatment, and a bevy of the younger disciples crowding around the confabulatory table with oblations of soup-

platefuls of the said appendages; if too, we saw, in this magic mirror, ignorant boys being castrated almost impromptu, hundreds of emasculated beings moping about and bemoaning their doltish credulity, showers of cases, ready for cutting, falling like manna, every morning, at one spot, while in another they drop in at the rate of one and a half the year,—should we not, to our shame, see ourselves as others see us? And if at the same time we were to hear a few of the sisterhood, more frightened than shocked, muttering remonstrances, and crying out like the Ephesians of old, that their craft was in danger,—say, should we not be bound to enter the strongest protest against their selfish wailings, and indignantly to denounce such follies as a personal degradation, a crime against society, and a dishonor to the profession?

T. SPENCER WELLS.

WE understand by the term "castration" the removal of normal or degenerative ovaries, not, however, including those which have developed into large tumors. The results of such extirpation are: (1) Amenorrhœa, (2) shrinking of the uterus and of the tubes. Exceptions are rare, and have their special causes, as, for instance, incomplete removal of the organs and inflammatory conditions; experiments on animals accord with those results. The uterus and Fallopian tubes in young animals do not develop, or may even undergo atrophy when the operation is performed in later life. The "rut" does not take place, or it vanishes if it has already appeared; moreover, this rule has individual exceptions, which, just as in human beings, find their *raison d'etre* in special conditions, as, for example, in cases of "perlsucht." Defect or rudimentary development of the uterus and amenorrhœa constantly accompany congenital deficiency or the rudimentary development of the ovaries, so that by this the dependence of uterine development and of menstruation on the ovaries is demonstrated. Also, the diminution of the uterus at the climacteric appears to be occasioned by the cessation of ovulation.

These facts are undoubted; on the other hand, we know little of the influence which castration exerts on the body as a whole, and on the nervous system. The investigations of Puech have aroused very serious doubts whether the female type of configuration, the development of the breasts and of the external genitals, the tone of the voice, the peculiar mental tendency and mode of thought of the female are closely connected with the presence of the ovaries. At any rate, the complete female type has been observed in women who have a congenital defect of these organs. Castrated animals show a greater inclination to the laying on of fat, but not after a morbid manner, but more as a co-phe-

nomenon of good general nutrition, even though no special mode of feeding is employed. This has also been observed often in spayed women. A quieter temperament is noted by veterinary surgeons as a further consequence, and is brought into connection with the cessation of the rut. A curative effect can be obtained by castration in two ways: either we remove the degenerated ovaries, the tubes, and accessible portions of the broad ligaments, because these structures *per se* provoke the pathological phenomena, or we extirpate both germinal glands, in order to use the influence of the climacteric period, viz., the suppression of ovulation, for the cure of certain local diseases of the sexual canal, especially of the uterus, or of certain general disorders and nerve affections.

Diseases of the ovaries and tubes, small cystomata, dermoid cysts, fibromata, follicular cystic degenerations, tubo-ovarian tumors, pyosalpinx, and others, may determine very considerable troubles and suffering, and among these, also, serious nervous derangements. The extirpation of such structures stands on the same footing as the removal of any other part of the body which has become useless and degenerate. The greater danger which is induced by opening the peritoneal cavity, is the only thing which makes a difference, so that we have to weigh carefully the injurious effects of the existing disease against the danger of the operation; but no one will doubt that such surgical operations are justified in cases where the nervous system is in a special degree injured by the above-named affections. This, however, is often the case, as well by reflex and sympathetic processes as by injury of the general state of health due to the constant pains, hemorrhages, and disturbances of digestion. Moreover, the tendency to psychical derangement often operates injuriously. Certain diseases and anomalies of the uterus, as hypertrophies, fibro-myomata, retroflexions, rudimentary developments, are by castration partly cured with much certainty, and parly hindered in their injurious actions. Nervous symptoms are induced very commonly in uterine derangements in a direct or indirect manner. The question of performing castration may arise in these cases as soon as a psychosis or highly developed neurosis is kept up by those affections; even when other consequences of them do not require the operation.

Castration further has not only been proposed, but also performed in cases where no demonstrable disease or anomaly of the sexual organs existed, but only a group of symptoms of nervous nature, such as is often observed in disorders of the genital organs. The existence of such a condition was assumed in spite of the negative result of the examination, and it was said that on account of its delicacy it was not accessible to our diagnostic appliances. This view scarcely deserved to be refuted. Just as there exists a nervous dyspepsia, so there exists also a group of symptoms in the nerves of the genitals and in their vicinity, without

there being the least anatomical alteration of those organs. The possibility that such a condition during the exploration may be overlooked, must be admitted, but who would undertake an operation fraught with danger to life on such a possibility?

Whilst in the above case the pathological alteration was always only taken for granted, by others it has been regarded as completely superfluous. The neurosis or psychosis is thought essentially to be induced by the sexual functions, especially by menstruation, in which the organs themselves may be quite sound. Appeal has especially been made to the periodic psychoses, and very serious epileptic or hystero-epileptic attacks appearing only at the catamenial epochs. The origin of these grave forms is certainly best elucidated by the consideration of the dysmenorrhœa so frequently occurring, in which either no change of the sexual canal is present, or the existing disease is out of all proportion to the violence of the disorder. We see that the patients in question often inherit a tendency to nervous disorders, or have been subjected in childhood to injurious influences, and have been badly educated as regards both mind and body, or have passed through grave acute or chronic diseases (*e. g.*, scrofulosis, chlorosis), at that time or in the years of development. Often even in their childhood manifest signs of nervous disorder were observed, even the first menstruation was attended with pain and illness. In all such cases the cause of the dysmenorrhœa must not be sought in the sexual organs, but in the condition of the body in general, and especially in the condition of the nervous system. If now, together with the usual symptoms of dysmenorrhœa, or in the place of the latter, we observe grave sympathetic pain in remote parts of the body, and motor and vasomotor disturbances, or even psychoses, we shall much more incriminate the general derangements. We are the more justified in this, as signs of nervous affection commonly also become evident in the interval.

The menstruation in this case only gives the last impulse to the complete outbreak of the disorder already imminent, and determines thus only the time of the attack. It must be allowed that this explanation does not meet the case invariably nor always completely; menstruation is not always the last drop of water which causes the already full vessel to overflow. Its part in the neurosis is sometimes manifestly greater, and cases are even seen in which that sexual function must almost exclusively be incriminated as the cause. I have seen strong, absolutely healthy individuals without any tendency to nervous disorders, without any troubles in the intervals, attacked by the most violent pains during their periods; sometimes more extensive consensual phenomena were present. No anatomical change in the genital canal was demonstrable. In one instance hereditary tendency was present, so far as the mother had suffered with the same symptoms. An explanation for observations

of this kind is with difficulty given. Abnormalities of structure probably exist in the ganglionic system or in the lumbar cord, in which exclusively the districts devoted to the sexual functions are concerned. This matter has in recent literature been treated but scantily and superficially, although the enigmatical phenomena appearing in such neuroses, and especially in vicarious menstruation, are of great interest. The older authors occupied themselves more with this subject and have brought together much relating to it, but the observations have been collected with so little critical acumen that they are useless. Naturally, on account of the darkness prevailing on this subject, it is impossible to lay down rationally an indication for castration in such cases.

Many gynecologists went now still further and completely gave up looking, not only for any pathological alteration of the sexual organs, but even for any connection of the neurosis or psychosis with the sexual functions. By this castration has been specially hindered in its development and in its reputation. The opponents won an easy victory in their opposition to an operation never free from danger, and which has to be executed in a disease standing in no causative connection with the genital apparatus. Battey has always maintained a causal connection with menstruation, and expressed himself very cautiously in setting forth indications for the operation: "In cases of long-protracted physical or mental suffering, dependent on monthly nervous and vascular perturbations, which have resisted persistently all other means of cure, the question of a resort to the operation is to be committed to the prudent judgment of the conscientious practitioner in each particular case." Battey and Sims (who first decidedly countenanced the operation in America) have, so far as I know, never once removed the ovaries unless considerable morbid conditions were present in the genital apparatus. Not until later have unwise castrations of this kind been often performed, when the organs were intact and the neuroses and psychoses were not at all, or but slightly, connected with menstruation.

An operative proceeding under such circumstances is not to be justified; the probability that after the removal of the germ glands nutrition will improve and the temperament become calmer, gives as yet no prospect of the cure of a grave neurosis or psychosis. The communications respecting the influence of the natural climacteric on the course of existing nervous disorders are too contradictory to enable us to form a right judgment. One psychical or nervous disorder vanishes about this time, another gets worse; even persons previously healthy get ill at this time of life. The conditions under which the one or the other happens have not been properly studied. The experiments which up to the present time have been made with the climacteric artificially anticipated by castration, in the troubles we are now considering, are not very inviting.

Castration is indicated in a psychosis evoked or maintained by patho-

logical alteration of the sexual organs, and in a neurosis originating from the same source, as soon as this imperils life or hinders all occupation and all enjoyment of life. The indication is also present when that disease represents only one causal factor in the genesis of the affection, without the removal of which a cure is not to be thought of. Of course, also, the remaining causes of suffering must be in this case accessible to treatment. Other milder methods of treatment must have been tried previously without success, or, as in the case of many small tumors of the ovaries and tubes, must from the outset give no promise of success. Castration must actually affect the cause which occasions or keeps up nervous irritation. The operation will thus be of use when a degenerated or dislocated ovary represents the irritative focus, or as soon as a greatly swollen and retroflexed uterus presses on the sexual plexus and the organ is brought into a state of atrophy. Castration promises success when the bleeding and anæmia occasioned by a fibroma play an important part in the maintenance of a psychosis, so that a cure does not appear possible without getting rid of that evil; but castration is absolutely no universal remedy for any neurosis originating from a genital-organ disorder, or kept up by the same. The cessation of ovulation will avail nothing if the irritation starts from the nerves which are compressed in a shrunken cicatrix of the broad ligament, or elsewhere in a cicatrix of the pelvic connective tissue.

The proof that a neurosis or a group of nervous symptoms has its cause in an affection of the genital organs cannot always be easily given. The simultaneousness of the two things proves, of course, nothing by itself; the seat of the nervous troubles is of great value; we find in woman, extremely often, phenomena which run their course in the numerous nerves connected with the lower part of the lumbar cord. A feeling of pressure, pain, and bearing down in the sacral region, dragging and radiating pains in the iliac regions and in the upper part of the thighs, coccydynia, and anæsthesias and hyperæsthesias of the introitus, vaginismus, bladder troubles, tenesmus, semiparesis of the lower extremities, and other symptoms belong here. The nerves with which we have to do here are often directly attacked by the disorder; for the most part, however, the phenomena are partially or almost exclusively of a sympathetic or reflex nature. The most varied combinations of the different symptoms are observed in reference to number and intensity. The series of phenomena have been brought for some time into connection with sexual disorders.

The later physiology, which has discovered in the lumbar cord a chief centre of the genital functions, speaks on the whole for the correctness of this view; those "lumbar cord symptoms" are in the woman incomparably more frequent than in the man, which agrees with the preponderating magnitude and importance of the sexual organs and

of their more frequent diseases. The presence of such phenomena is, however, no sure sign of the causal connection, since those may very well have another origin, viz., independent affections of the nerve centres and of the vertebral column, anæmic conditions, irritation of distant peripheral nerves other than those of the sexual apparatus, so that we observe them decidedly not rarely, when the latter is completely intact; whilst we sometimes find them wanting, though very severe morbid changes exist. Its presence has always a decided value in support of the assumption of a causal connection, and this so much the more when the symptoms gradually extend themselves more widely from the sexual organs and their neighborhood, and thus stage by stage the nerves lying higher up are involved. At times this advance takes place along with the also gradually increasing local affection; in other cases, an "aura" in the course of the lumbar nerves precedes the attack occurring in some part of the body at a higher level, or precedes an attack of general convulsions. Simple painful sensations which radiate from the pelvis toward the hypochondria, breasts, and shoulders, are very frequently complained of. Also we sometimes see neuroses only on the side of the body on which the organs (ovary, tube, ligament) are exclusively diseased. A neurosis in parts of the body lying at a distance changes its seat sometimes for one which appears in the genitals or in their vicinity. Many nerve tracts are very intimately connected with the sexual apparatus; the consensus with the stomach, throat, breasts, larynx, thyroid, has been already dwelt upon by the old physicians. Individual nervous symptoms readily concur with determinate genital disorders; thus the pains from the iliac region radiating toward the hypochondria, breasts, and shoulders, concur with inflammatory conditions in and around the ovary; gastric disturbances concur with retroflexion of the uterus.

Great stress has been laid on the time relation between the first appearance and the later progress of neuroses and certain phases of sexual life. The nervous affection begins with puberty or with the first cessation of the periods in the climacteric; it appears only during menstruation or in the middle of the interval, or in pregnancy. The coincidence with menstruation, as we have above remarked, has been overestimated; it is, however, always of importance, and this so much the more the more free from trouble the interval is. The connection may sometimes also be demonstrated by the vanishing of the neurosis during a certain stage of sexual activity. The cause is then usually very clear, as in the rising of a uterus which has become pregnant out of the pelvis. Sometimes it can be demonstrated that the neurosis has arisen simultaneously with the beginning of the anatomical change, and that every exacerbation concurs with an exacerbation of the sexual disorder. The outbreak and conversely the restraint of nervous symptoms by mechanical agents—*e. g.*, pressure purposely made to operate on the sexual organs, especially on

the ovaries—has been looked upon as a very certain proof of their origin. The incorrectness of this view has soon been made evident. The nervous system is so coherent a whole, that a transfer of the irritation, especially in the morbid state now under consideration, is very easily possible in all directions. An irritation applied to the ovaries may, therefore, start an attack which originally arose primarily in a reflex manner from some other part of the body, or which had its origin in an alteration of the centre.

The risk of deception is especially great when the phenomenon starts in the sexual organs, whilst the cause is situated in the centre, as is not rarely the case in central ovarian neuralgia. Pressure on the ovary is in this case often extremely painful, just as touching the face in a tic douloureux of central origin. The dependence of a neurosis on a sexual malady can unfortunately but rarely be demonstrated in the way of experiment; this may occur, however, especially in anomalies as regards form and position of the uterus, as when reposition, the introduction of a ring, or the straightening of the organ has put an end to obstinate vomiting, hemiplegia of the lower extremities, or a persistent convulsive cough, whilst the recurrence of the dislocation immediately recalls the old mischief.

The determination of the causal connection gains in certainty if we are able to follow the genesis of the neurosis. The more immediate causative motor through which the first attack on the nerves arises, and the place where this happens must be discovered. The direct effects of the original irritation but seldom remain isolated on account of the special quality of the female nervous system. Further sympathetic and reflex influences soon come into play, so that the first starting-point is, it must be confessed, often not easily found out. Compression as well as extension and dragging of the nerves, partial or complete exposure of their terminal branches, play continually a principal part in the production of the first phenomena. Pressure is occasioned in a double way, a swollen or dislocated organ, or an exudation, or a special tumor, compresses the neighboring nerves, even a whole plexus; quite as often compression takes place in the interior of the tissue, as in inflammatory foci, connective tissue hyperplasias of the uterus, and is especially marked in the contractive processes of the ligaments and of the pelvic connective tissues. The contracting stroma in the so-called cirrhosis of the ovary hinders the dilatation of the follicles, gives an impulse to their abnormal involution and to abnormal conditions of tension. Dragging occurs especially in sinkings, prolapses, and backward displacements of the uterus, dislocated ovaries, small very movable ovarian tumors; combinations of dragging and pressure occur in inflammatory processes attacking the peritoneal attachments of the uterus, as soon as the intra-abdominal pressure is increased by the upright position, by walking, or by some

powerful action of the diaphragm. The degenerated tissue is compressed in considerable flexions at the angle of bending, and stretched at the opposite wall. Retained secretion conditions tension in endometritis, and excites contractions which are the more painful the less easily the outflow takes place. Stenosis due to swelling of the mucous membrane of the cervix or simultaneous flexions, may then act especially injuriously. Also draggings of the adhesions, which have been produced during the perimetritis which so often complicates these affections, are results of those contractions. The natural movements of the uterus and the bladder, and their extensibility, are hindered by their being embedded in contracting exudation, which gives occasion to painful contractions and dragging on the stiff, surrounding parts. The extraordinarily severe colics which often set in in an intermittent manner in carcinoma of the body of the uterus, in extensive endometritis, and in pyosalpinx, are sufficiently known.

There are catarrhs of the vagina which are accompanied by atrophic processes, attended even by formation of considerable strictures; these though occurring for the most part in elderly women, are sometimes, however, met with in young people. Severe irritations ensue especially when coitus is not avoided; moreover, infective and even innocent catarrhs of the sexual canal, and even of the introitus, together with papillary swellings, erosions, intertrigo, and at the same time excrescence at the meatus urinarius not infrequently lead to troublesome nervous complaints. Considerable gaping of the introitus with insufficient closure of the vagina favors the penetration and the action of all mechanical and infectious agents.

Anatomical changes are not always very extensive and may yet lead to very considerable irritation; large neoplasms, carcinomata, ovarian tumors often cause no nervous disturbances, while a little cicatrix and apparently unimportant dislocation induce such. No measurement is possible in dealing with manifestations of nerve life, nor does the intensity of the disease do it. An ovary of which the ovulating tissue is completely destroyed, causes less trouble than one whose follicular apparatus, partially preserved, is embedded in a contracting stroma. The development of a somewhat intense nervous disorder from such a starting-point depends on very different factors. Many women have for years their local painful sensations limited to special tracts, others show more numerous phenomena in different branches of the sacral aud lumbar plexus, without any important general nervous condition arising therefrom. Many, certainly, present one or other sympathetic symptom beginning in more remote parts of the body—*e. g.*, an intercostal neuralgia, an irritating cough, a cardialgia, without on this account any necessity arising for assuming the existence of a general neuropathy. The circumstances which induce such a state, are long duration of the local

disease, complicating effects of the same—*e. g.*, loss of sleep and of appetite from the pains, accompanying losses of blood, copious leucorrhœa, dyspareunia, and in consequence mental depression and too great attention directed to the evil. The involvement of the psyche which often soon ensues, usually leads rapidly to a general neuropathic condition. When we have to discuss the question of executing an operation dangerous to life, we must procure complete information respecting the following points—viz., whether the genital disorder existing is the only, or at least most important etiological factor for the origin of the neurosis, whether other causal motors are not in operation, and what significance these have when such are present. This is so much the more necessary as the dependence of the neurosis on the sexual disease is seldom direct, as in the case of an experiment, but can only be established through a kind of indicative proof. We must therefore carefully test the different points which speak for and against, and, also, finally endeavor to exclude other causes, which have especially to be weighed in considering the genesis of the nervous disease. To this category belong diseases of other organs and parts of the body, especially of the stomach and large intestine. An error may easily creep in when retroflexions are present from relaxation of the peritoneal attachments of the uterus. We are very much inclined to ascribe the complaints which in such cases are often meet with, to that dislocation; this, however, is often incorrect, or not justifiable, since very often an extensive insufficiency of the whole pelvic portion of the abdominal wall, and of the peritoneal attachments of numerous viscera exists with all its consequences—*e. g.*, depression of the liver, mobility of the kidneys, hanging down of the intestine from an elongated mesentery, ampliation of the stomach, meteorism, and others. The retroflexion represents only one part of a more extensive anomaly.

The exclusion or consideration of causes which, without having anything to do with the diseases of special parts of the body, bring forward that which we so commonly try to comprehend under the names of neurasthenia, spinal irritation, and hysteria, is for us of the greatest importance. We shall consider thus the congenital tendency which is sometimes expressed by coexisting formative defects of the body (signs of degeneration), hereditary conditions, the injurious influences operating in childhood—*e. g.*, bad corporeal and mental education, chronic and acute grave disorders. Unsatisfied sexual impulse, onanism, coitus interruptus, the use of preservative means, fruitless attempts at cohabitation from the narrowness of the hymeneal opening, or from the defective power of the man, emotional troubles (especially such as operate during a great length of time), grave diseases as typhus, and especially diphtheria, the manifold harmful agencies of social life, often lead to grave nervous disorders. Certainly, sexual circumstances often come into play

even at the first excitement of the nervous condition, or sexual influences produce this effect at a later period. In many cases neurosis and sexual disorders are coresults.

We will finally discuss the causes of the mishaps which unfortunately are not rare, and which have brought the operation otherwise so beneficial into discredit. Castration has had the same fate as many other curative measures; it was at the outset received with enthusiasm, was announced as the arcanum for all possible evils, and has finally in many quarters been completely rejected, when it did not of course completely fulfil the previously cherished expectations. The greatest part of the defective results has doubtless depended on the false position of the indication. All operations which are undertaken without the presence of a disease or anomaly in the sexual system are, according to the present standpoint of our knowledge, unjustifiable. The mere presence, however, of a pathological change in the genital system, as has commonly been held, is not sufficient, and a strict proof of the causative connection between that change and the nervous disorder has to be demanded. It was, moreover, not suspected that castration, even when the causal connection existed, might not yet be able constantly to affect the motor of the sexual disease from which the nervous excitement proceeded. Far too little regard was paid to the causes, which together with the genital affection coöperated in the origin of the nervous affection. The cases in which the sexual diseases can be described as the only, or almost only cause of the evil, are certainly not very frequent. Several or even numerous factors concur in the production of the symptoms, as we find to be the case in many other pathological conditions. Castration may here be fully indicated, since it often procures the condition under which alone cure is possible, but also the actions of other than the sexual causes must then be accessible and subjected to treatment. A supplementary treatment of this kind must of course follow castration, when the tedious troubles induced by sexual disorder have produced such extreme nervous weakness and irritability that the latter cannot possibly vanish immediately after the operation. The so-called stability—*i. e.*, the duration of the neurosis after the cause has been removed—we sometimes find here, as well as in other cases; we shall, therefore, do well to watch our cases of operation for some considerable length of time.

This is also needful, because a circumstance belonging to the natural consequences of castration not unfrequently acts unfavorably on the nervous system. The natural climacteric change induces sometimes, even in healthy women, a multitude of nervous and even psychical phenomena. The vasomotor disturbances are especially notorious. This effect of the change of life commonly operates still more effectively in persons whose nervous system is already deranged. The artificial anticipated climacteric will therefore, equally with the natural, act with more potency on

patients in this state, and will evoke the ordinary nerve disorders of that epoch in an exaggerated form, and with recurrences more or less positively expressed, of the troubles on account of which the operation has been performed. Happily, the prognosis in these cases is not bad. Improvement ultimately sets in, though certainly often after somewhat long delay. I have seen complete recovery take place in several women, in whom these troublesome conditions had lasted over a year. The view here and there expressed by some gynecologists, according to which the cure of a neurosis obtained by castration is the result only of psychical impressions, finds in the above fact its best refutation.

Another not infrequent cause of ill success consists in the setting up of circumscribed inflammations of the peritoneum and connective tissue, or in the exacerbation of such processes existing prior to the operation. The changes are for the most part not very extensive, consisting of connective tissue capsules round the ligatures, small knots, cicatrices, hard shrunken portions of the ligaments, cords and thready adhesions between the different pelvic structures, or even between these and the intestines. The course of the inflammatory process is often very insidious (creeping). The first ten or fourteen days after operation may be free from fever. I have no doubt that "pathemata" of this kind are more frequent in all laparotomy cases, and those with intra-peritoneal treatment of the stump, and also in ovariotomies, than is usually assumed to be the case. The occasions thereto are, however, in castration more often present in that operation. We have two commonly stiff, short but wide pedicles, formed by the removal of the tubes, which is generally undertaken at the same time. The mucous membrane of the tubes is not seldom diseased, and therefore easily sets up infection. A remnant of the ovary left behind, or part of a pathologically altered tube, has in some cases formed the starting-point of inflammation; the material of the ligature may sometimes be at fault, at least one has seen in abscesses and perforations the remnant of the threads. These inflammations, and the atrophic processes therewith connected, give, of course, as elsewhere, occasion to nervous irritations. The relapses which often occur very late, even sometimes after the lapse of a year, though the neuroses had completely vanished immediately after the operation, are certainly to be explained partly in this manner.

The inflammatory processes have not rarely yet another injurious sequel. This is the onset of periodic hemorrhages resembling menstruation; we must, however, completely abandon the idea that ovulation alone can cause periodic discharges of blood from the sexual passages. Various other processes, among which we must place mechanical disturbances of the circulation, and nervous influences acting through the vasomotor nerves, are equally able to do this. We have among the pathological conditions, in the ligaments, often on both sides, compres-

sion of the vessels which return the blood, collateral fluxions, and nervous irritations. The inflammatory focus arises in the site of the germ gland, and the same nerves are affected, not in their internal filaments only, but also in their larger branches. We have even observed swelling of the focus during the hemorrhage corresponding to the enlargement of the ovary during the time of menstruation, and therewith labor-like pains analogous to the ordinary troubles of dysmenorrhœa. Other additional facts may be adduced in favor of the view respecting the cause of many periodic hemorrhages after castration. The natural climacteric is often very notably delayed in cases of chronic pelvic peritonitis, hydrosalpinx, and pyosalpinx. I have seen menstruation occur quite regularly in young women suffering from pyosalpinx with greatly contracted ligament, though the ovaries at the operation were found completely atrophic and bereft of follicles. The ovaries were extirpated along with the tubes, and in spite of this the periodic hemorrhage continued. Long ago inflammatory affections of the uterine appendages, small ovarian tumors complicated with pelvic peritonitis, and salpingitis were looked upon as causes of menorrhagias and irregular hemorrhages. Morbid processes in the uterus and its vicinity may, after the climacteric has long run its course, produce periodic discharges of blood. Veterinary surgeons ascribe the duration of the rut after castration to pathological conditions of the sexual organs, especially in cows, to tubercular deposits in the mucous membrane of the tubes and uterus.

The object of castration cannot, of course, be attained so long as the duration of a periodic hemorrhage, or of irregular congestive conditions and hemorrhages, is kept up by inflammatory foci. If the neurosis had its motor in the ovary, another focus of irritation appears in the place of the diseased organ; if the cause lay in the uterus, its atrophy and the suspension of its activity are not attained.

Such chronic inflammatory processes are with difficulty completely avoided. Silk appears to be not altogether the best material for ligature, since it is difficult to disinfect it completely, or at least, though disinfected, it readily takes up again injurious matter. Catgut is not always applicable, at least not in cases of very stiff, unyielding ligaments. A perfectly healthy tube is best left behind, when this can be done with complete extirpation of the ovary; its removal at the same time necessitates a more considerable ligature, and a great mass of enclosed tissue. Under such circumstances extirpation is quite superfluous, since the Fallopian tube after castration atrophies quite as much as the uterus. A diseased tube must, of course, always be removed. The formation of adhesions to the intestines is best avoided by inducing early action of the bowels after the operation. In every case we must keep our patients under observation for a considerable period; temperature observations must be kept and a suitable treatment begun on the appear-

ance of inflammatory phenomena. Defective cicatrization or even the formation of neuromata in the ligatured pedicle has been described as the cause of unfortunate results, and this view has been supported by the analogy of amputation stumps. This appears *a priori* not improbable. More accurate observations with anatomical examinations are wanting.

On the other hand, there is no doubt about the injurious influence of considerable relaxation of the abdominal walls, or actual eventrations and gastrocele. Those conditions are either already present before castration and are then increased by the latter, or they develop only after the operation and in consequence of it. The bad results are produced partly by the depression of the intra-abdominal pressure, partly through the traction which the attachments of the viscera experience, when the external support is defective. Lastly, we must still mention that to imperfections in the execution of the operation, not infrequently may be attributed the blame of a bad result. The incomplete extirpation of the ovaries is a point here to be especially noted. We have to do, as it appears from what has gone before, in this matter of castration for neuroses, with very complicated circumstances. The matter is not nearly so simple as it might have appeared at the time of the first operation. In order to insure success, we must very accurately lay down the indication for each individual case, especially keep apart the various causal motors concerned in the production of the nervous disorders, and be sure that we do not merely touch on the sexual factor, but also be able to put aside other existing injurious influences. The execution of the operation and a careful after-treatment in reference to the possible consequences, have still to be very carefully considered.

Successful results will not be wanting if we proceed according to the principles laid down in this essay. I dare not say that, especially in the beginning of my castrations, I have had no bad results; but I have also had many results of a brilliancy that can rarely be witnessed after any other operation.

ALFRED HEGAR.

WITHIN my knowledge it has not been the practice of American surgeons to attempt the cure of mental and nervous disorders by the removal of healthy ovaries or of healthy tubes. The ovaries removed, and the tubes as well, have presented visible signs of disease—signs which are evident to the naked eye and palpable to the sense of touch. For the misconception upon this point still existing, my own ignorance of both the histology and pathology of the ovaries is largely responsible in that, during the early history of the operation, I removed ovaries which I erroneously supposed to be healthy, and gave to the operation the unfortunate and now obsolete name of "normal ovariotomy."

In the ovaries are quite frequently found small cysts, more or less numerous, filled with a clear, yellow liquid, alone or intermixed with blood, and of variable consistency. This form of cystic degeneration is to be distinguished from the early stage of ordinary ovarian cystoma, in that it is extremely slow in its growth, remaining almost stationary for one, two, or three or more years, and in that it is often accompanied by pain, by great tenderness of the ovaries, by derangements of the stomach, breaking down of the general health, and, quite often, serious disturbances of the nervous system. In some cases these cysts appear to take on an acute inflammation of the lining membrane and the contents become purulent. Another form of ovarian disease exhibits a sort of sclerosis of the investing tunic, it being thickened, blanched, and generally corrugated. The stroma also presents a sort of fibrous degeneration. In other cases the ovaries are very much shrunken in size, and resemble in gross appearance the senile condition of these organs. Quite often the ovaries are bound down by adhesions to adjoining structures, or so buried in lymph deposits as to be with difficulty even recognizable.

The tubes removed have presented evidences of chronic salpingitis, or were specimens of hydrosalpinx or pyosalpinx. Often the tubes too are extensively adherent to contiguous structures by plastic lymph.

The operations now under consideration have been done for the relief of mental and nervous disorders, which may be divided into three classes, namely, oöphoro-mania, oöphoro-epilepsy, and oöphoralgia. I use the terms oöphoro-mania and oöphoro-epilepsy instead of hystero-mania and hystero-epilepsy, because my clinical experience teaches me that these disorders are dependent upon a nervous irritation proceeding from the ovaries and not from the uterus. I say that my clinical experience so teaches me, because, (*a*) I find the disorders existing in cases where I recognize organic disease of the ovaries, and am not able to recognize any organic disease of the uterus; (*b*) in cases of uterine as well as ovarian disease, when the diseased ovaries are removed, the nervous disturbance disappears notwithstanding the fact that a displaced or diseased uterus may remain. In my experience the time required for the disappearance of nervous disorders, after removal of the ovaries, has been quite variable. In general, epileptiform manifestations have ceased at once. Some of the cases have required for a time the tranquillizing effects of the bromides to ward off threatening symptoms, whilst others have needed nothing. My cases of mania have all been quite chronic and the improvement has been slow. In oöphoralgia, in a few instances, the cure has been immediate and permanent. In the majority it has been slow and gradual; and in others nothing has been gained for even two years after the operation. In a few of these cases the long-established opium habit has proved a complete bar to recovery.

In my cases which have had two years or more to test them, seven

have been cases of oöphoro-mania; nine, cases of oöphoro-epilepsy; and twenty, cases of oöphoralgia. The results have been tabulated as follows:

	Cured.	Improved.	Not improved.	Total.
Oöphoro-mania . . .	1	4	2	7
Oöphoro-epilepsy . . .	9	0	0	9
Oöphoralgia . . .	13	3	4	20
Total . .	23	7	6	36

With reference to the tubes, I may say I have no experience of the effects of their removal on the state of health. It has always been my practice to remove them when diseased and let them alone when sound. In retrospecting my cases I am not able to say that the removal or non-removal of one or both tubes has in any wise seemed to affect the final results of the operation. Of the thirty-six cases now reported, I find:

	Cured.	Improved.	Not improved.	Total.
Both tubes removed . .	1	0	1	2
One tube removed . .	4	1	2	7
Tubes not removed . .	17	5	5	27

It should be remarked, of the cases of mania, that the duration had been from three to fourteen years. Three had been inmates of asylums—one of them for nine years. Of the epileptic cases the majority were of one to three years standing and one extended to six years. The cases of oöphoralgia varied from three to twelve years in duration—but few of them less than five years.

The published records of similar operations in America are not accompanied by such authentic statements of their after-progress as to make them useful at all for my present purpose. When it is noted that the neuroses have disappeared, or have persisted, the lapse of time has been entirely insufficient to determine any positive result. In my own cases a patient who has seemed to be entirely well at three or even six months after operation, has afterward relapsed again into the old rut. *Per contra*, another case which has been little, if at all, benefited during the first year, at the expiration of two, or even three years, proves to be soundly cured. These remarks are especially applicable to oöphoralgia. My cases of oöphoro-epilepsy have given me the most satisfactory results. The cures have been both prompt and complete. This may be in part due to the fact that the exigency of the cases has brought them earlier to the arbitration of the surgeon's knife. Indeed, I am quite convinced of the fact that earlier operation of neurotic cases, before the nervous system has become too much enslaved, can alone yield results fully satisfactory.

It is an interesting fact that removal of the ovaries has been occasionally followed speedily by acute mania. One such case was shown me some years ago by Prof. T. G. Thomas, of New York, the only one I have

had opportunity to observe. Several such cases have been reported, one by Prof. Goodell, of Philadelphia. Such result is not, however, peculiar to this operation, for it has been observed to follow upon other surgical operations in no wise connected with the reproductive apparatus. It has occurred to me to see the operation, in two instances, followed by acute parotiditis, suggestive of the metastasis in the opposite direction, so often observed in mumps. Dr. Goodell, and others, have reported such cases.

The limited time at my disposal has not allowed me to gather the results of American operators as fully as I would have desired. I am, however, able to cite, in a general way, the experience of a few of them.

Prof. Wm. H. Byford, of Chicago, writes me: "Sixteen years ago I was consulted by a married woman, aged twenty-eight, who had two children, about a large ovarian tumor of five or six years standing. In giving the history of the case she informed me that she had epilepsy since about the time she commenced menstruating. At first the fits came at long intervals and were mild. They gradually became more frequent and grave, until they returned once in two or three weeks and were intensely severe. Her mind was so much impaired as to cause great anxiety to her friends. She was, in fact, in such a dilapidated condition as to excite discussion between her friends and physicians whether the risk of so grave an operation as ovariotomy was worth while. It was determined to rid her of her great burden in the hope that it might somehow benefit her general condition also. The tumor was large, polycystic, and extensively adherent, and the operation was attended with much difficulty. The opposite ovary being cystic and four inches in diameter was also removed, and I noted at the time that both ovaries were completely extirpated. Twenty-four hours elapsed before she rallied entirely from the shock, and a moderate attack of septic peritonitis protracted her convalescence to over four weeks.

"The points of interest to us in the case are: 1st. That during the second night after the operation and whilst under the influence of morphia for pain, she had a frightful attack of convulsions, so severe and prolonged as to cause great consternation and alarm for her immediate safety. The phenomena were characteristic in every way of an epileptic attack. 2d. That she never after had another convulsion and is to-day in the enjoyment of excellent health. Was it true epilepsy this woman had? I have not now, and never had, a doubt about it. It was recognized as epilepsy by all the physicians who saw her. A noteworthy fact in this connection is that one of her sisters, much younger than herself, is now passing through a similar epileptic experience in a milder form of hystero-epilepsy. She has decided ovarian symptoms and the paroxysms are becoming more and more pronounced, and bid fair, if not interrupted, to result as disastrously as in the older sister. I forbear speculative remarks, and simply give the facts as I observed them. I think, however, they demonstrate clearly a connection between the reflex effects of ovarian disease and true epilepsy in some cases.

"In a case of double oöphorectomy for the relief of prolonged invalidism attended by frequent headache of indescribable severity, the operation was an entire success. This patient, four years before the operation, was insane for several months. It is now five years and the patient remains in good health.

"Three years ago I did this operation for an aggravated form of nymphomania. The patient is now cured of her terrible malady. The ovaries and tubes in this case were greatly congested, and the tubes were removed as well as the ovaries. In the second case, the ovaries were in a state of incipient, cystic degeneration; the tubes appeared healthy and were allowed to remain.

"In looking over my cases I find that all my patients on whom I have operated for nervous disorders were greatly benefited. Some of them have passed from my observation, and of these I cannot say how permanent the improvement has been. Whilst no doubt oöphorectomy is too frequently resorted to, I entertain no question that it is entitled to a legitimate place in surgery for desperate nervous conditions."

Prof. Reamy, of Cincinnati, writes: "I have removed the ovaries in but one case for relief of epilepsy. This patient likewise suffered dreadfully from ovarian neuralgia, and dysmenorrhœa. The time since the operation—only a few months—is too short to determine what the results are to be; however, up to present time relief has been complete. In two other cases where I have done the operation for relief of dysmenorrhœa and neuralgia, one case is completely relieved, the other not improved. My opinion is that in properly selected cases the operation is invaluable in its results, effecting complete cures in some cases and marked relief in others. It is my serious belief, however, that the operation is liable to abuse, and that there is a growing danger in some quarters from this cause."

Prof. M. D. Mann, of Buffalo, reports two cases operated on for ovarian neuralgia more than two years ago. Both were relieved of pain, making slow but sure recovery, and adds: "It seems to me in properly selected cases, the operation is not only justifiable but urgently called for, but that these cases are very few."

Dr. R. S. Sutton, of Pittsburg, gives me the particulars of one case of insanity:

"My case was Mrs. R., aged thirty-one, operated on September 16, 1884. Her uterus was retroverted and firmly adherent posteriorly. The left ovary and tube were glued together by adhesive inflammation and lay behind the uterus adherent in the cul-de-sac. The right ovary and tube were glued together and adherent to the side of the rectum. All adhesions were broken up and both ovaries and tubes removed by Tait's method. The woman recovered and is still living. Her insanity soon disappeared and she remains free from mental diseases and from nervousness. I have observed in many cases that when marked nervousness existed, it either entirely disappeared or was greatly lessened after removal of the ovaries or ovaries and tubes."

Prof. W. T. Howard of Baltimore, kindly communicated two very interesting cases.

1. "Miss J. H., single, aged twenty-three, consulted me in December, 1882. She began to menstruate at fifteen, and enjoyed excellent health until she was twenty. During the past three years she has suffered intensely the entire menstrual period of five to seven days. During all this period she had numerous attacks of hystero-epilepsy; the convulsions were often violent, and she would lie from seven to ten days with her feet perched high upon the wall as she rested in bed, in a state of hysterical coma, more or less profound, moaning and groaning in the most pitiable manner. The conjunctivæ were finely injected. All the

symptoms became intensified by even slight pressure over the ovaries. She had well-marked anteflexion and catarrh of the uterus. When she emerged from the catamenial period she was moderately intelligent until the next one arrived, but was subject to epileptic convulsions. I treated the uterine troubles until they seemed to be quite relieved, and kept her all the time upon Brown-Séquard's prescription for epilepsy. But there was no improvement in the severe dysmenorrhœa, and at times she would lie in a state of coma, writhing in pain, for ten days together. I was compelled to use hypodermatics of morphia very freely, as nothing else gave her relief from her intense agony. I have never seen any one suffer more severely from any disease whatever. She was repeatedly leeched over the ovaries, and counter-irritation by tincture of iodine and emplastrum cantharidis was employed many times, all to no purpose. I should have stated that at each menstrual period there was oozing of blood from the umbilicus and she often spat blood from the mouth, but did not cough it up nor vomit it. Having despaired of relief by other means, I removed the ovaries and tubes November 19, 1883. She was then very thin and pale—looked as if she would ere long find relief in death. She had a severe attack of peritonitis, and was ill for near five weeks. She made a perfect recovery from the operation, and all the distressing symptoms gradually disappeared. She never menstruated from the uterus afterward, but for some months at the catamenial periods she would bleed about the umbilicus. The last I heard of this lady she had recovered and married, perhaps six months ago. The ovaries were at least twice the normal size and resembled in appearance those from another case which were examined for me by an excellent pathologist and microscopist, Dr. W. T. Councilman, of the Johns Hopkins University."

2. "Miss B., single, aged twenty, consulted me in April, 1884, and was under my care for nearly three months. For more than two years she had suffered from severe and almost incessant cephalalgia. She had no uterine disease whatever, but was constantly in a hysterical, and hyperæsthetic condition; indeed, I have never seen any one more so. She had been treated by a highly intelligent physician of Virginia, where she resided. He had carried her to New York, where she remained for some months under the care of one of our most eminent general practitioners. Her physician told me she had taken her weight in bromides and chloral until now they have no effect whatever. A seton had been inserted in the nape of the neck and one in each iliac fossa. These had only the effect of producing local pains, but in no way alleviated the intense headaches, which nothing but the hypodermatics of morphia could diminish. Indeed, these were her only hope of respite so that she could get some hours of disturbed sleep. Having failed to diminish the poor girl's sufferings I sent her home.

"She returned to me again November 3, 1884, when I removed both ovaries and tubes. No unpleasant symptoms followed the operation, and in a few days the cephalalgia greatly diminished. She returned home January 14, 1885, with her parents, who were delighted with the result of the operation. She seemed like a new being. She was their only child, a handsome girl, of noble figure. But the fates were against her. Three or four months subsequently she sustained injuries from an accidental fall which terminated her life in a few days.

"The following is Dr. Councilman's note of the condition of the

ovaries: 'The ovaries contain cysts of various size, due to simple dilatation of the Graafian follicles. In addition to the cysts, there is a good deal of induration of the stroma, and in the right ovary an enormous formation of bloodvessels. In character this vascular formation consists of small arterioles which are in general tortuous and traverse the tissue in every direction. In some places they are so numerous that they resemble very much the convoluted sweat glands of the skin. In the left ovary I found several of the so-called menstruation fibromas, due to fibrous degeneration of the corpus luteum. The Fallopian tubes were dilated and the mucous membrane thickened and hypertrophied.'"

Dr. H. P. C. Wilson, of Baltimore, writes:

"In my hands the operation of 'castration' in women for nervous and mental diseases has been most satisfactory; all the cases that I and my son, Dr. Robert T. Wilson, have operated on for the above conditions have been either much benefited or entirely cured. I have only time to mention one case operated on by Dr. Robert T. Wilson. A single woman, aged thirty-five, had been the subject of hystero-epileptiform convulsions for several years. When brought to the hospital she would have from three to five a day, so violent at times as to endanger her limbs and apparently her life. She was worn away to a skeleton and her general nervous condition was indeed pitiable; all general and local treatment had been used without benefit. She grew worse. Her ovaries were removed. Her convulsions ceased. Her general nervousness is very little. She is able now to earn her own living and is an entirely different woman. I think the operation saved not only her mind, but her life also. I think the operation should only be done when all else fails to give relief."

Dr. B. F. Baer, of Philadelphia, says:

"My experience with the operation of 'castration' of women for mental and nervous diseases is quite limited, but what I have had is not favorable."

Prof. Wm. Goodell, of Philadelphia, writes:

"After the lapse of many years my cases of oöphorectomy for insanity, for hystero-mania, hystero-epilepsy, and pelvic neuralgia, show positive and permanent benefit. I can recall but two failures, and those were two cases out of eight of insanity or threatened insanity. The remainder, six in number, were cured. I ought, however, in candor to add that a ninth case, a dreadful one of hysteria, menorrhagia, and dysmenorrhœa, had two attacks of insanity after the removal of her ovaries."

Dr. T. Addis Emmet, of New York, says:

"I believe when the ovaries have become diseased (so that the condition can be recognized, and after other means have failed), they should be removed, and, as a rule, the same conditions will call for the removal of the tubes at the same time. I believe the field to be a very limited one, calling for the removal of the ovaries, whilst still in a comparatively healthy condition and before they have degenerated into new growths. The operation of 'castration' should be confined, in my judgment, to cases of absence of the vagina and uterus, where it is necessary to remove a source of irritation in existing epilepsy, insanity, or threatened phthisis in consequence of the want of development.

"I have watched with interest a number of cases where 'castration' had been performed in young women suffering from various nervous conditions, and, as a consequence, I am not an advocate for its perform-

ance. I feel satisfied that the operation would be seldom needed if these women could be removed from home and sympathizing friends, and could be placed under the needed moral influence, where they could be taught to get their nervous symptoms under control; and more especially where patient attention to details could be given with the object of improving the general condition.

"I have seen a few cases greatly benefited after the ovaries had been removed, but the nervous and neuralgic symptoms from which they suffered were, in my judgment, due to an anæmic condition. Efficient as the remedy may be, its practice is a reflection on our skill as physicians, and I am not willing to admit that 'castration' is necessary to cure anæmia and its consequences. I believe that the ovaries have very little influence, if any at all, in producing the symptoms attributed to them, and that the defect lies beyond in the great nerve centres. We are certain to see, and in the near future, a great reaction. I am therefore delighted that you should be selected to investigate and report progress, for I know you are too honest a man to advocate the frightful abuse of the operation existing at the present time.

"In my early life I had the opportunity of witnessing and of making many hundreds of post-mortem examinations. I was then impressed with a fact which has its bearing on this subject. I learned from observation that what seemed to be a perfectly healthy ovary, was a condition seldom found after death in any woman over twenty-five years of age. Cystic degeneration was very common, and often the ovaries were found bound down by old pelvic inflammations, when, during life, not the slightest symptom had been given to indicate any unusual local disease. In other words, I will state that every day ovaries are being removed for various nervous symptoms, and the roughened surface and cystic condition are shown as evidence of the necessity of their removal; a condition where I believe, as a rule, there exists no connection between the supposed cause and effect. The condition presented is often but a normal one, for every ovary undergoes the same cystic degeneration and becomes more and more roughened on its surface, year after year, from ovulation, until at length atrophy readily occurs as a consequence."

Prof. T. Gaillard Thomas, of New York, writes me:

"For all nervous and mental disorders in women which are created, or markedly aggravated by the process of ovulation I regard 'castration' as a most valuable resource. Thus far, my experience in the operation for *purely* nervous and mental disorders has not been very large. It extends to five cases:

"1. A case of insanity almost confined to the period of ovulation. 2. A case of hystero-epilepsy. 3, 4, 5. Cases of epilepsy; in one case confined to the menstrual epochs, and in two cases greatly aggravated by them. The case of menstrual insanity has been entirely relieved, as I learn by a recent letter from the lady's brother-in-law, a physician practising in New Jersey. The case of hystero-epilepsy is cured. The case of epilepsy confined to menstrual periods is cured. The two other cases of epilepsy seem in no wise improved. 'Castration' of the female for nervous diseases has, in my opinion, a brilliant future before it, and yet, I feel that in this and in other conditions it is now being greatly abused by resort to it in entirely inappropriate and unnecessary cases."

ROBERT BATTEY.

REVIEWS.

THE INTERNATIONAL ENCYCLOPEDIA OF SURGERY. A SYSTEMATIC TREATISE ON THE THEORY AND PRACTICE OF SURGERY, BY AUTHORS OF VARIOUS NATIONS. Edited by JOHN ASHHURST, JR., M.D., Professor of Clinical Surgery in the University of Pennsylvania. Illustrated with chromo-lithographs and woodcuts. In six volumes. Vol. VI. 8vo. pp. xlviii. 1272. New York: William Wood & Co., 1886.

THE last volume of this very valuable work has appeared, and the difficult task of the Editor has been accomplished. The labor of collecting the articles of distant and dilatory authors has occupied time, and has necessarily left for this volume certain chapters which would otherwise have appeared earlier in the series. The present volume begins with the œsophagus, and, in addition to abdominal surgery and the surgery of the uro-genital tract, includes an unusually interesting set of articles on diseases of the bone from the Lyons School, orthopædic surgery, hospital construction, military surgery, and the history of surgery.

The opening article on "Injuries and Diseases of the Œsophagus" is written by Dr. J. Solis Cohen, Professor of Diseases of the Throat and Chest. Dr. Cohen's name alone is a guarantee of the excellence of the work. If the author can treat diseases and injuries of this portion of the body as well as he writes of them, he constitutes a significant example of the tendency to a gradual absorption of general surgery by the various specialties. It has been said that all that is now left for the general surgeon are fractures and amputations. Now that laryngologists consider themselves at liberty to write about the stomach, the statement does not seem exaggerated.

The article on "Intestinal Obstruction" is by the Editor himself. In view of the great prominence at the present time of this department of surgery, and the growing tendency on the part of surgeons to resort to abdominal section in the various forms of obstruction, the conservative attitude taken in this article imparts to it special value. The author calls attention to the existence of enteritis in a large proportion of the cases of intestinal obstruction, and he strongly urges that the abdomen should not be opened, unless the surgeon "has been able to form some distinct notion of what he expects to find, or at least until he has been able to satisfy himself that there is positive mechanical occlusion, and that no less dangerous operation will suffice for its relief." In cases of acute obstruction not obviously due to a mechanical cause, the treatment should be that adapted to enteritis, which consists in either general or local bleeding, the employment of poultices, warm enemata, and opium. A striking example is given of the advantages of this mode of treatment. We do not find mentioned in this article as a substitute for laparotomy in certain cases the method described a few years ago by Mr. Hutchinson, which consists in the administration of an anæsthetic and the employment of massage to the bowels, with inversion of the body. We

have seen an obstruction relieved in one case by the simple administration of ether.

Dr. Ashhurst is not an enthusiastic disciple of Lister, and we are therefore not surprised to find that he does not value antiseptic precautions in laparotomy. We presume few would now dissent from his objections to the use of the spray; but the number of surgeons is also very small who would not insist upon a strict application of all other principles of antiseptic surgery in these operations. The tables which accompany this article are, as is usual, in the writings of this author, very full and accurate. The article is a short one, but is replete with valuable suggestions.

The article on "Diseases of the Rectum" is written by Mr. Allingham. The author labors under the disadvantage of having little new to record in this department of surgery. That part devoted to cancer of the rectum is of interest as showing the practice of a prominent English surgeon in a class of cases the treatment of which varies greatly in different countries. The experiences here recorded do not give an encouraging outlook. Mr. Allingham says that the operation of excision, which he has performed about forty times, "is one likely to afford excellent results, and I am sure that, with increased experiences, the direct mortality may be decreased." Of all his patients, but one is alive seven years after the operation, although a number are still living at the end of two years. He protests against the practice of performing colotomy simply because a cancer exists in the rectum, and would limit that operation to those cases in which an obstruction or some complication exists and in rapidly growing cancers. It is evident that a slight reaction is taking place against the very free resort to colotomy by English surgeons. Further experience in this direction may confirm the more favorable results obtained in Germany after extirpation.

A very considerable portion of this volume is given to the consideration of "Genito-urinary Surgery," and the subject is divided among various authors. A very full description is found in that part devoted to the treatment of stone, of the various forms of evacuators used in litholapaxy, the new operation having given rise to a vast amount of mechanical ingenuity. It has been thought advisable, nevertheless, to give space to a separate chapter on the operation of lithotrity. On the injuries and diseases of this region one of the most valuable articles is by Reginald Harrison, which treats of the bladder and prostate. We note with interest the brief account of the operation for prostatotomy, reported by the author at the International Medical Congress of 1884, an operation designed for cases not susceptible of relief by the ordinary means of treatment. The author defines the class of cases as that which "includes those in which there is unusual difficulty in using the catheter, in which hemorrhage almost constantly attends the use of this instrument, in which withdrawal of urine is followed by no sense of relief, and in which the bladder, by the constant presence within it of pus and tenacious mucus, is converted into little else than a chronic abscess-cavity through which urine percolates. These conditions represent types of the disorder which are rapidly fatal."

The operation consists in opening the membranous urethra from the perineum, then introducing a probe-pointed knife along the prostatic urethra, and making a section of the obstructing portion of the gland

in the median line. A drainage tube is subsequently worn in order to render the section permanent.

The article on "Diseases and Injuries of the Urethra" is by Dr. Simon Duplay, of the Lariboisière Hospital, and is interesting as a statement of the present practice of urethral surgery in the French school. Taking the treatment of stricture of the urethra as a standard of comparison between the French and the American schools, we think few readers would hesitate to decide that the former has not made that progress of late years which might have been expected. Many of the more advanced modes of treatment very generally adopted in this country are conspicuous by their absence. We are glad, however, to record that the old method of gradual dilatation has not been abandoned, as many readers of our periodicals might suppose, but finds in the author a staunch supporter.

"Injuries and Disease of the Female Genitals" have been allotted exclusively to American writers. Dr. Theophilus Parvin, Professor of Obstetrics and the Diseases of Women and Children in the Jefferson Medical College, writes the opening article. Here we find described the great variety of operations designed for the cervix, vagina, and perineum. As this article is written for a surgical work, it is not to be expected that much space should be devoted to local treatment, or to the use of pessaries. We fail, however, to find any mention of Alexander's operation for shortening the round ligaments, although the various colporrhaphies are carefully described and the text is pithy and clearly illustrated. Little is known, to be sure, about this operation, but many satisfactory results have been reported, and surgeons would naturally look for an account of the operation in an article of this kind. Dr. Parvin's skill as a writer has enabled him to produce a very readable chapter.

The chapters on "Cæsarean Section," by Dr. R. P. Harris, of Philadelphia, and on "Ovarian and Uterine Tumor," by Charles Carroll Lee, of New York, are both carefully prepared and well adapted to this work, and will be read with interest by the general surgeon as well as by the specialist.

Perhaps the most novel feature of this volume is the series of articles on "Diseases of Bones," by the late Prof. Ollier, of Lyons, and his pupils. Many American and English readers will doubtless find these chapters hard reading, and we fear they will not receive that attention which they deserve. In this country we excel in the practical treatment of bone disease, but the lack of knowledge of the pathology of this very common class of diseases is wofully great. At the present time, when surgeons are beginning to be aroused to the fact that tubercle is as much, if not more, a surgical disease than medical, the relation of tubercle to caries possesses an unusual interest. We have space to refer to but one or two points in the leading article by Ollier himself. The prominence given by him to that part of the bone designated the juxta-epiphyseal region as a point of origin of many of the diseases of childhood, is worthy of special mention. He says: "I have given the name juxta-epiphyseal to that expanded part of the diaphysis which is included between the central canal and the connecting cartilage, and it will suffice to bear in mind its structure and its relations in order to comprehend its importance in relation to osseous pathology." Not only owing to its physiological properties, but to the mechanical

strain brought to bear upon this part of the bone is due the importance of this region. "This zone of physiological proliferation is also the zone of election of pathological processes." . . . "The idea of juxta-epiphyseal osteitis then appears to me one of the fundamental points of the pathology of bones, wherefore I shall not cease to call attention to its nosological significance and to its therapeutic consequences." Ollier resorts freely to trephining, and recommends this operation in all painful forms of osteomyelitis.

Dr. Eugene Vincent, of Lyons, Surgeon of the Charité Hospital, writes upon the scrofulo-tuberculous affections of bone. The author divides these into the undoubtedly tuberculous osteopathies and the probable tuberculous osteopathies. To the former class belong encysted tubercle, or a cavity in the epiphysis containing cheesy material and tuberculous infiltration or the gelatinous transformation of spongy bone. In the latter class are found caries and spina ventosa. Whether bacilli are always found is doubtful, zoöglœa masses of micrococci having been observed in some cases reported. Further examinations are needed, of course, to establish these forms of bone disease on a firm basis, when we may hope for a somewhat more uniform and rational treatment of the masses of cases which crowd our clinics. We are glad to see that the seashore home is thought as important a factor in the treatment of the children of the poor as it is in this country, and the writer very properly suggests that these institutions should not be limited to the summer, but that suburban homes should be open the year round. No greater field is open to the rich philanthropist to-day than this. Among local remedies the hot iron figures conspicuously. According to Ollier, this "brings about necrosis of the carious portions; it imitates the process by which nature puts an end to caries in many cases. It has the advantage over spontaneous mortification of the diseased bone of exciting an energetic irritation; a healthy inflammation in the tissues which surround the necrosed part." Such treatment seems more rational than the simple scraping of caries, with which most surgeons are content. Whether many could be found to follow the author's advice in slight joint lesions of this nature, to open the joint with the cautery, and when the joint is opened, to "bream it with enormous cauterizing irons until the fluids which escape from it are at a temperature which the finger cannot bear," we think is doubtful. If, however, the articular surfaces are seriously diseased, he would not hesitate to prefer resection. M. Poncet's article on tumors of the bone is a fit companion to those of his colleagues, but we have not space to do more than allude to it by title.

The final article is devoted to "Orthopædic Surgery," by Mr. Frederic R. Fisher, Assistant Surgeon to the Victoria Hospital for Sick Children, London. It contains many useful details of treatment of deformities. The editor has very properly added a few remarks on the treatment of congenital dislocation of the hip-joint. The very remarkable case of cure reported by Dr. Buckminster Brown, of Boston, shows conclusively that we are no longer justified in classifying these cases in the class of incurable diseases.

The appendix to this volume is one that no reader can afford to overlook. Dr. Edward Cowles writes a chapter on the "Construction and Organization of Hospitals." His experience as army surgeon, as Superintendent of the Boston City Hospital, and later of the McLean Asylum,

has amply fitted him for the task. It is freely illustrated, and is a distinctly valuable addition to the literature of this subject.

Dr. Bennett A. Clements, of the U. S. Army, gives an account of the preparation of military surgeons for field duties, with descriptions and illustrations of the latest forms of ambulances and other apparatus required. The traditions still preserved from the War of the Rebellion and the constant need of active frontier service, give weight to the opinions of an experienced army officer even in times of peace.

A very condensed and erudite paper on the "History of Surgery," by Dr. George Jackson Fisher, of New York, closes this volume.

The first edition of the encyclopedia is now before the profession, but a favorable verdict has already been accorded to it in advance, and we feel sure that few will maintain that it is not fully equal to any work on surgery which has hitherto appeared in the English language. We have already alluded to the comparison between this and French and German works, the almost interminable length of which enables the reader to obtain great fulness of detail upon any special point referred to. We think, however, that wisdom has been shown in adopting a work of this scope as best adapted to the present needs of the profession, and we most heartily congratulate the editor and the publishers on the complete success of their undertaking. J. C. W.

MEDICINE OF THE FUTURE. AN ADDRESS PREPARED FOR THE ANNUAL MEETING OF THE BRITISH MEDICAL ASSOCIATION IN 1886. By AUSTIN FLINT (Senior), M.D., LL.D. 12mo. pp. 37. New York: D. Appleton & Co., 1886.

THIS book will be received by the profession with unusual interest, from the peculiar circumstances of its preparation and appearance. Nearly a year ago Dr. Flint accepted an invitation to deliver the annual Address in Medicine before the British Medical Association in August of the present year. He had long been recognized, both at home and abroad, as the most prominent man on this side of the Atlantic in the department of general medicine, and as eminently fitted, by his capacity and attainments, to speak for his colleagues on such an occasion. Whatever he might say would command earnest and respectful consideration. He evidently gave to the subject his deliberate and careful attention. During the time remaining to him he prepared the address, without haste, in the intervals of his regular professional occupation, and while enjoying, for the most part, his customary mental and physical vigor. On the 13th of March he was suddenly and unexpectedly prostrated by a cerebral attack, and expired after a few hours of nearly total unconsciousness. The manuscript was found among his papers, so complete that it needed only the ordinary proofreading by his son, to prepare it for the press; and if the author had lived he would probably have changed it but little, if at all, either in matter or form. It is an address which was written, but never delivered. It has all the freshness of a living discourse, and it is the more impressive as coming from one who is no longer among his fellows.

It will strike all who are familiar with Dr. Flint's writings that there is in this essay no sign of impairment of his mental powers. If anything, its style is more lucid, more direct, and more agreeable than in his previous works. There is an ease of manner, and an absence of laborious composition, most appropriate to an anniversary address; and the successive topics are treated in a way to maintain the interest of the reader, without imposing too serious a task upon his memory or attention.

The author claims his privilege as a "medical semi-centenarian" to review the changes and improvements in medical science and art for the last fifty years; but, as implied in the title of the address, he uses this retrospect mainly to indicate the probable bearing of similar changes in the future. He believes that the time which is coming will be a period of progress, equally with that which has gone by; and that a judicious estimate of what has been done in the last fifty years will afford a good criterion of what may be accomplished in the next. No one knows better than himself, that a novelty is not always an acquisition; and that the new ideas or discoveries, sometimes in vogue, too often enjoy a short-lived popularity and then disappear forever. There have been many such failures in the past, and no doubt there will be others in the future. But when the improvements in any department of medicine have followed, on the whole, a particular course for half a century, it is reasonable to expect that the next fifty years will see them continued in the same direction. The possibilities of further development are by no means exhausted when we have reached the limit of our present opportunities; because other methods or combinations may at any time be discovered which will carry us at once by a new road far in advance of the old stopping-place. This is happily illustrated by Dr. Flint in the case of microscopic technology. The achromatic object-glass, which was practically completed in 1830, first gave us an instrument really serviceable in the examination of the tissues; so that it is fair to include, among the fruits of the last half century, the "creation of histology by means of the microscope." Improvements in the quality of the glasses, modes of illumination, width of angular aperture, immersion lenses, and the like, increased considerably the amplifying power and definition of the microscope. But these improvements were matters of detail, always restricted within certain limits; and it seemed as if little more could ever be accomplished by the aid of magnifying instruments, when, fifteen or sixteen years ago, a new era was inaugurated in histology by the use of *staining reagents*. "The process of staining, which has done so much for pathology, may be extended and applied to the study of the normal as well as morbid components of the body. It is a fact, significant as regards the future, that the use of dyes has brought into the range of vision objects which, without their use, the microscope fails to make visible."

The last half century has also seen what Dr. Flint calls its "crowning epoch" in the doctrine of the bacterial origin of disease. The growth of this doctrine forms a most interesting and instructive history, from the slow advances formerly made in the study of local and limited parasitic affections, the knowledge of minute cryptogamic vegetations and their part in the processes of putrefaction and fermentation, to its more recent and rapid development by the systematic cultivation and inoculation of microscopic organisms. Notwithstanding the temporary errors and uncertainties inseparable from so new a method of investigation, there can be no doubt that the idea of the propagation of infectious disease by living

germs is now firmly established in the minds of the medical profession. Dr. Flint fully believes in its reality and importance; and he anticipates from it a practical revolution in the treatment and prevention of many morbid affections. He regards it as a "demonstrated truth that the specific causes of certain of the infectious diseases are microörganisms." This definite and intelligible etiology will take the place of our former vague doctrine that diseases or epidemics may originate from incidental causes, or sometimes even spontaneously. Such an explanation can only be the expression of ignorance; because it overlooks the fact that "spontaneity is no more applicable to pathological conditions than to any other of the phenomena of nature." "It is a trite truism," says Dr. Flint, "to say that all effects have adequate causes. To say that a disease has a spontaneous origin is no less a solecism than to regard a waterfall as fortuitous, taking no account of gravitation." When we learn that a certain malady is caused by the introduction and development of specific germs from without, we have gained a most important item of information in the natural history of that disease. We have, furthermore, the surest guide for its successful treatment. In certain cases a parasiticide application will absolutely put an end to the disorder, by destroying the microscopic organisms which have caused it; and where this direct treatment is impracticable, may we not so modify the conditions of the system as to arrest the propagation and development of the foreign intruders?

But the greatest advantage to be expected from our knowledge of bacterial etiology is not in the cure of diseases after they have arisen, but in their prevention beforehand. "The destruction of organisms outside of the body by disinfectants, and by the removal of all the accessory conditions necessary to their existence, together with their effectual exclusion from the body, may, and indeed it is more than probable will, reduce the fatality from infectious diseases, in the order of Providence, much sooner than the discovery of effective therapeutic agents."

There is yet another method which promises still greater results in the control of infectious disease; that is, inoculation. We have long known, from a blind experience, that the poison of variola may be rendered less dangerous by inoculation; and we have all wondered how it could be, that so mild a contagion as vaccine should protect against the dreaded onset of smallpox. Now we know that the element of contagion, in both these maladies, is a microscopic germ. Moreover, the contagious organism of the vaccine lymph is specifically the same with that of smallpox. But it has been modified by passing through the system of the cow, so that it no longer produces in the human body the violent reactions which it would have excited originally. Nevertheless its specific character remains, and it is consequently a protection against its own recurrence in any form. Like a sour and knurly apple that has been planted and cultivated, in genial soil, till it has become mild and sweet, it is still the lineal descendant of its progenitor, and will reproduce its kind as before; but without the harsh and repugnant qualities which it formerly possessed.

The most active researches in the study of infectious disease, at the present time, have for their object the modification of specific virus by different methods of treatment and cultivation. Their results thus far may not be in a form to command universal acceptance; but they show the direction in which future progress is anticipated by many persistent

and enthusiastic investigators. Dr. Flint cordially recognizes the value of these labors and believes that they will bear fruit hereafter.

"There are present intimations," he says, "of important discoveries respecting inoculation with attenuated viruses and contagia, in order to forestall the development of infectious diseases. Here open up to the imagination the future triumphs of preventive medicine in respect to all classes of disease. The zeal and activity in this department of medicine often, in spite of obstacles arising from popular prejudice and indifference, redound to the glory of the medical profession."

Beside looking forward to the coming changes and improvements in medicine, the author indulges in some anticipations as to the future character and status of the physician. Following, as before, the history of the past, and taking into account the tendencies of the present, he finds reason to think that medical men in the next half-century will be still better acquainted than now with the natural history of disease, with its causes, variations, and limitations, and will rely upon this knowledge more than ever in their methods of treatment; and that the public will also reach a more just and enlightened appreciation of the medical art.

"It is a pleasant thought that hereafter the practice of medicine may not be so closely interwoven as hitherto, in the popular mind, with the use of drugs. The time may come when the visits of the physician will not, as a matter of course, involve the coöperation of the pharmacist; when medical prescriptions will be divested of all mystery and have no force in the way of fortifying the confidence of the patient. The medical profession will have reached a high ideal position when the physician, guided by his knowledge of diagnosis, the natural history of diseases, and existing therapeutic resources, may, with neither self-distrust nor the distrust of others, treat an acute disease by hygienic measures without potent medication."

No reader who takes up this short but instructive address, will lay it aside without following it to the end. It will give him an interesting retrospect of the past half-century, an agreeable entertainment for the present hour, and abundant food for reflection.

DICTIONARY OF PRACTICAL SURGERY, BY VARIOUS BRITISH HOSPITAL SURGEONS. Edited by CHRISTOPHER HEATH, F.R.C.S., Holme Professor of Clinical Surgery in University College, London; Surgeon to University College Hospital; Member of the Council and Court of Examiners of the Royal College of Surgeons of England. 8vo. pp. 825. Philadelphia: J. B. Lippincott Company, 1886.

OSTENSIBLY this work is intended for the busy general practitioner who desires immediate and concise information as to the diagnosis and treatment of emergency cases; but, in reality, its scope is much wider. For instance, the text on the subjects of lithotomy and lithotrity by Mr. Cadge, really contains more information and actually occupies more space than the corresponding sections in most standard works on surgery. The absence of illustrations detracts somewhat from the usefulness of these articles as well as the almost complete absence of description of instru-

ments, but these are not usual in a work of this kind and their omission permits a greater expansion of the text. In addition to the articles on special subjects, general articles on deafness, diseases of the eye, skin diseases, etc., have been widely introduced, cross references being given whenever necessary.

A careful examination of this work enables us confidently to recommend it to our readers. Of course, we cannot endorse everything contained in the work, for in many points we differ greatly from the authors, but, taken as a whole, the work is full, accurate, and up to the times. It is only necessary to mention among the many eminent contributors such names as W. Morrant Baker, Richard Barwell, Marcus Beck, Edward Bellamy, Wm. Cadge, R. Brudenell Carter, Davies-Colley, Dyce Duckworth, Mr. Gamgee, Mr. Godlee, Mr. Hayward, Mr. Berkeley Hill, Sir James Paget, Sir William Mac Cormac, etc., to insure the acceptance of the correctness of our statement.

While from the scope of the work anything like an analytical review is out of the question, there are a few points which we desire to comment upon. For instance, in Mr. Stokes's description of Syme's amputation, he says that in those cases where there is much prominence of the heel the plantar incision "may" be "sloped toward the heel," and speaks of it as "this modification." Whether the heel be prominent or not, this should always be done more or less, and it is *not* a "modification" of Syme's original operation but a point upon which its originator lays especial stress.

These are Mr. Syme's own words with reference to this point: "the point of the knife is introduced immediately below the malleolar projection of the fibula, rather nearer its posterior than anterior edge, and then carried across the bone"—*i. e.*, calcis—"slightly inclining backward." In another place he mentions the necessity of this if the "heel be unusually prominent." In our opinion, it had better *always* be done to a greater or less extent, and the results will speak for themselves. Upon the other hand, most surgeons do not make the plantar incision in a Pirogoff amputation exactly the same as in a Syme's amputation for certain obvious reasons which we will presently give. As these two amputations are among the few which demand for their successful performance exactness and neatness, whatever renders them easy or difficult should be made specially clear for those inexperienced operators who will refer to this work in an emergency. This may seem a little point, but the unnecessary pulling upon and scoring of the cellular tissue caused by *not* sloping the incision toward the heel in a Syme's amputation is too often the cause of sloughing of the flap.

Upon the other hand, unless the plantar flap be sloped forward, away from the heel, and made a little longer on the inner side than upon the outer, the posterior tibial artery runs serious risk of being wounded. While this may not impair the vitality of the flap of a Syme's amputation, it certainly will that of a Pirogoff.

Among the many excellent sections we would specially call attention to those on "Septic Diseases," "Septicæmia," "Sapræmia," "Sepsis," and "Pyæmia." We wish that the limits of this review would admit of a more extended notice of their merits, but while the articles are full, they are in reality so concise as to admit of no further condensation without seriously impairing their lucidity, so that we can only advise our readers who are interested in this subject to study these sections for themselves.

The single article contributed by Sir James Paget on "Old Age" is, as one would expect, a model of its kind, clear, philosophic, and eminently suggestive. He calls attention to the fact that the generally accepted belief as to the danger of hemorrhage in the old is erroneous, unless the patient be very infirm or unsound. Anæsthetics, he considers, are well borne, but in strange contrast to the statement that elderly people are apt to have weak hearts, he prefers chloroform to ether, as less apt to excite bronchial irritation or pulmonary congestion. While these objections to the use of ether are, to a certain extent, valid, certainly in this country ether would be preferred on account of its non-depressing action upon the heart. Why the old should be less apt to suffer from septic poisoning or pyæmia we cannot understand, since in them the eliminative organs are so apt to be inefficient—notably the kidneys—which certainly in sapræmia seem to be the chief aids in the elimination of the poison. Coming from so eminent an authority, and doubtless the result of an extended personal experience, we can only accept it as a fact. It certainly must be explainable on different grounds from the well-known immunity from septic troubles the young enjoy, which is doubtless due to the healthy condition of all their tissues, especially those of the emunctories.

We could fill page after page with comments on the many good, and the fewer bad points of this work, but we must close with the earnest recommendation to our readers that they buy and read the book, feeling confident that our favorable judgment will not be reversed, provided the intentions and scope of the work are constantly kept in mind.

C. B. N.

HYPERALIMENTATION IN PHTHISIS.

DIE UEBERNÄHRUNG BEI DER LUNGENSCHWINDSUCHT. Von DR. E. PEIPER, Greifswald. (*Deutsches Archiv für klin. Med.*, 37 Bd. S. 377.)

HYPERALIMENTATION IN PHTHISIS. By DR. E. PEIPER.

USVOYENIYE I OBMEN AZOTISTUIKH VESHCHESTV PRI KORMLENII CHAKHOTOCHNUIKH PO SPOSOBU DEBOVE' A. By M. G. KURLOFF. (*Vratch*, No. 37, 1885.)

ASSIMILATION OF NITROGENOUS SUBSTANCES IN THE HYPERALIMENTATION OF PHTHISIS PATIENTS BY DEBOVE'S METHOD. By M. G. KURLOFF.

SINCE Debove's communication to the Medical Society of the Paris Hospitals, in November, 1881, in which brilliant results were described as having been obtained by the treatment of patients in advanced stages of phthisis by means of forcible feeding (*hyperalimentation*, *sur-alimentation*, or *gavage*), but little attention has been paid to his method by English and American physicians. Several communications on the subject, however, have from time to time appeared in Continental journals by Dujardin-Beaumetz, Mesnet, Desnos, Pennel, Broca and Wins, Schreiber, Ferrand, Bull, Voitoff, and by the two writers whose papers are named at the head of this article, and who seem to have

worked independently of one another, their papers being published about the same time.

Debove's system has for its object the restoration of the tissues, weakened by the disease, to their pristine condition, in which they are far less capable of acting as breeding ground for tubercle bacilli. This is accomplished by compelling the patient to take a large quantity of highly nutritious food, consisting of meat powder (prepared by drying finely minced meat on metal plates over the fire) suspended in lukewarm milk with the addition of eggs.

Dr. E. Peiper treated fourteen phthisis patients in the Greifswald Clinic with Debove's nutritive mixture. Some difficulty was experienced at first, owing to the objection of the patients to the stomach-tube. He then succeeded in persuading them all to swallow the food themselves. At first half a litre of milk, twenty-five grammes of meat powder, and several eggs were given at meal-times twice a day. These quantities were gradually increased, till from 200 to 300 grammes of meat powder were taken some four times a day, vegetables and wines were also given. Twelve of the patients increased from five to twenty-two pounds in weight. Cough and expectoration in all cases diminished, in five cases the night-sweats decreased, and in three more ceased. Gouty symptoms appeared in three cases.

Dr. M. G. Kurloff set before himself a much more difficult task than the mere repetition of Debove's clinical observation on the general improvement produced in phthisis patients by the method of forced feeding, though incidentally, as it were, his observations on this point accord with those of Debove, Peiper, and others. His main object, however, was to define the nature and extent of the change caused by hyperalimentation in the assimilation of nitrogen, both during the time the treatment was being carried out, and after it had been stopped. For this purpose he selected five undoubted cases of phthisis, all of whom suffered from want of appetite, diarrhœa, pyrexia, cough, and expectoration, which contained Koch's bacilli. The patients were first put upon the ordinary hospital diet, consisting of porridge for breakfast, soup with meat for dinner, soup for supper, and a daily allowance of "half-white bread." The composition of this diet was approximately known, and, therefore, a calculation could be made of the nitrogen ingested, analyses of the urine and feces giving the amount excreted.

"The data thus obtained were of course not novel, but merely confirmed the well-known fact that the quantity of nitrogen ingested by the body in phthisis is less than that excreted, the difference varying from day to day. In all cases, however, the nitrogen ingested and excreted by phthisis patients is far below the amounts observed in healthy persons."

Hyperalimentation was then commenced and continued for a period varying from six to eleven days. In some of the cases Debove's plan of introducing the food through a stomach-tube was adopted, no difficulty being found in passing the tube, as the pharynx was brushed over with a one per cent. solution of cocaine, which prevented the patients feeling the discomfort usual during the introduction of œsophageal instruments. This system of anæsthetizing the pharynx with cocaine had also been made use of by another Russian observer, Dr. V. E. Nyeshel, who, in carrying out a series of investigations on digestion requiring the introduction of the stomach-tube, found that when he painted the pharynx with a five per cent. solution of chlorohydrate of cocaine a few minutes

before the introduction of the tube, the latter was swallowed easily and quickly, no unpleasant results being observed. (*Dissertation for Doctor's Degree*, St. Petersburg, March 31, 1885.)

Dr. Kurloff was, however, in some cases enabled to dispense with mechanical assistance altogether, the patients taking the nutrient mixture from tumblers. This mixture was composed of meat powder suspended in milk, the whole having a consistency somewhat greater than that of ordinary chocolate. The meat powder was not prepared precisely as in Debove's experiments, but was made from meat from which all the juice had been expressed, a waste product, in fact, in the manufacture of meat juice, and, consequently, an exceedingly economical source from which to obtain the meat powder. 700 cubic centimetres of this mixture were given at a time, 400 grammes of meat powder being thus administered in three or four doses during the twenty-four hours. As it averages 12.713 per cent. of nitrogen this quantity corresponds to about 1500 grammes, or nearly four *funts* (3¼ pounds) of fresh meat, reckoning this to contain 3.4 per cent. nitrogen. (*Voit.*)

The minimum administered was about half this quantity. In addition, the patients were given as much milk as they could drink, which averaged 3200 c. cm., the maximum being 5200 and the minimum 1325 c. cm. Bread and biscuits were allowed according to the patient's desire. Generally, however, they took these only at the commencement, but afterward refused them entirely. Thus the mean quantity of nitrogen ingested was 54.154 grammes, corresponding to 1600 grammes of fresh meat, the maximum of nitrogen ingested being 80.687 grammes, corresponding to 2400 grammes, or more than 3½ pounds, of fresh meat per diem.

"Under the influence of this enormous quantity of nitrogen the transformation of albumen in the body, and consequently the excretion of nitrogen with the urine, increased very considerably. Thus the urinary nitrogen excreted daily averaged about 34 grammes, the maximum being 56.26 grammes; while before the experiment, on the ordinary hospital diet the urinary nitrogen varied from 9 to 16 grammes, according to the condition of the appetite, fever, etc.

"With regard to the assimilation of nitrogen, that also increased decidedly, averaging 91 per cent. of that ingested, while previous to the experiment the amount assimilated varied from 76.7 to 88 per cent."

A table is also given showing that

"The quantity of nitrogen assimilated per kilogramme of body during the hyperalimentation increased more than threefold, and, moreover, on the days following the hyperalimentation it was somewhat larger than it had been previously to it. . . . The appetite of the patients, even after such a moderate continuance of the treatment as I employed, usually improved to a remarkable extent. They began to finish their diet ration and asked for more! . . . whereas previously they had scarcely been able to take the half of it. The increased quantity of food ingested added to the increased assimilation produced a rapid rise in the body weight amounting on the average to 420 grammes (about fifteen ounces) per diem. The increase of weight obtained persisted, as may be seen by some of the diagrams appended, some time after the hyperalimentation had ceased, and even continued to rise still higher."

In one of the cases only, which was that of a patient who was dying, the treatment did not succeed in arresting the rapid decrease of weight.

Generally during the treatment the patients felt better, the dyspnœa disappearing, the cough and expectoration diminishing, and the nocturnal

sweats being arrested. The temperature, also, showed a distinct tendency to decline. The semiliquid stools became firmer, except in the case of the dying patient and in that of another, where at first the diarrhœa increased, but stopped on the substitution of boiled for fresh milk, and, moreover, did not recur subsequently when a return was made to fresh milk. The only improvement in the physical signs was some diminution in the dry and moist râles.

The following cases will serve as examples of the observations conducted by the author:

CASE I.—S . . . noff, aged thirty-two years, trimming maker, weight on admission 39,250 grammes, of short stature, pale, feeble, greatly emaciated. No family history of phthisis. Distinct dulness in both apices, especially in the right, where bronchial breathing is heard with medium sized râles. These, however, are not universal and not very numerous. In the left apex the breathing is harsh and vesicular, and at times sibilant rhonchi are heard. Cough distressing and frequent. Expectoration slight, but containing multitudes of Koch's bacilli. Evening temperature 38.6° C. (101.3° F.). Appetite poor, semiliquid stools four or five times a day.

The patient was ordered to take the nutrient mixture, 200–250 grammes of meat powder and 2½ litres of milk being given daily. This hyperalimentation was continued for eleven days, at the end of which time the body weight had increased 1600 grammes (56½ ounces). Before the commencement of the treatment, when the patient was on the ordinary hospital diet, he assimilated a mean percentage of 76.7 of the nitrogen ingested. During the hyperalimentation this rose to 85.4 per cent., and after it it fell to 75.5 per cent. for each kilog. of body weight. He assimilated before the hyperalimentation 0.32 gramme nitrogen, during it 0.93 gramme, and after it 0.33 gramme.

From the first day of the hyperalimentation, though the patient felt better, the diarrhœa increased, and was only checked on the ninth day by the substitution of boiled for fresh milk. All the time he felt exceedingly well, the cough almost ceased, the expectoration ceased, the temperature became normal, the violent sweats were arrested, and the man was able to sleep. Four days after the treatment was discontinued the weight was found to be still increasing, the appetite was still good, and the man felt so well and strong that he left the hospital in order to resume his usual work in the factory.

CASE IV.—P . . . tseff, Vasili, aged twenty-six years, painter. No family history of phthisis. Four years ago he had abdominal typhus, after which time he felt unwell, and became more than once an in-patient in hospital. The last time he was admitted into the Abukhoff hospital on the 27th of January, 1885, with wasting, general debility, loss of appetite, cough with expectoration, and exhausting night-sweats. On the 10th of March, by the kindness of the senior medical officer, Th. Herman, he was transferred to the clinic.

The skin and mucous membrane were pale, and there was but little subcutaneous fat. Distinct changes in both apices, with well-marked cavities in the left. Sputum nummulated, secreted in considerable quantity, and containing numbers of Koch's bacilli and elastic fibres. The weight of the patient before the treatment was subject to irregular fluctuations, but with a general tendency to fall.

After the time of the first hyperalimentation, which lasted six days, he felt exceedingly well, and had gained 3000 grammes (40½ ounces) in weight, the rise continuing even after the cessation of the treatment. Subsequently he again felt worse, the hæmoptysis returning, and continuing for three days. Nine days after the first trial of the treatment the hyperalimentation was again resorted to. Again he took for six days through the stomach-tube 300 grammes of powdered meat, and 4 litres of milk, and again he immediately felt better. The diarrhœa ceased, and he increased four kilog. (141 ounces) in weight. At the end of a week after the second course of hyperalimentation the patient

left the hospital confident that he was cured. His appetite had remarkably increased; his weight, however, did not remain as high as it had been, but began to fall again, though more slowly than after the first course of treatment.

The nitrogen assimilated at the time of the treatment was considerably increased, being 93.5 to 92 per cent., while previously, the other circumstances being the same, it varied from 82 to 86 per cent.

The writer concludes his interesting paper by pointing out that though the stage of enthusiasm for an indiscriminate application of this method of treatment may give place to its limitation to special classes of cases, still it must be acknowledged that we are by forced alimentation enabled in a very short length of time to accomplish that which should be the end of all treatment, the improvement of the weight and general condition of the patient, so that he has hopes that if the disease be thus attacked in its earliest stages a permanent cure may result.

As to the troublesome nature of the treatment, he remarks that all methods of treatment which are really valuable, such as sending patients away to places where the climate is suitable, or to koumiss establishments, involve a large amount of trouble, and he points out that French physicians have been able to carry out Debove's system with hospital patients so that the difficulties, to say nothing of the expense, are much less than those involved in climatic cures.

Of course, Dr. Kurloff's experiments would have been much more valuable if he could have kept the patients under observation for some weeks after the treatment, and if, too, he could have observed the results of prolonged treatment. He, Dr. Peiper, and others have, however, made out a very good case for the extension of the trial of the system to England and America, where, as we hinted before, it seems to be less known than it should be.

THE MODERN TREATMENT OF STONE IN THE BLADDER BY LITHOLAPAXY. A DESCRIPTION OF THE OPERATION AND INSTRUMENTS, WITH CASES ILLUSTRATIVE OF THE DIFFICULTIES AND COMPLICATIONS MET WITH. By P. J. FREYER, M.A., M.D., Bengal Medical Service; Civil Surgeon, Mussoorie. 8vo., pp. x. 116. London: J. & A. Churchill, 1886.

IF anything is gratifying to the leader of any great movement, it is to see the principles which he thinks true and important winning the confidence and support of others, and making way against the opposition which naturally arises against whatever is opposed to the general opinion. Such gratification has fallen in an unusual degree to the lot of Professor Bigelow, whose method of litholapaxy may be said to have revolutionized the treatment of stone in the bladder. This operation now seems to stand upon a secure footing, free from the weakness which would follow an exaggerated estimate of its applicability, and well defined in its indications and *technique*. This can be gathered from a study of what is going on all over the world, and it has recently been put into convincing and pleasing shape in the monograph of Dr. Freyer.

Dr. Freyer is an India surgeon, who, from a large and successful

experience in the operation of litholapaxy, has been led to commend it to his professional brethren in that country, and to give them a succinct account of its history, as well as of the manner of performing it. In respect to both these divisions of the subject, his book is most admirable. In discussing the former, it is the more interesting because it is somewhat controversial. The author has, with impartial pen, pointed out and corrected the mistakes which were made by Sir Henry Thompson in regard to the operation proposed by Professor Bigelow. The need for doing this is shown by the fact that Dr. Freyer himself was among those surgeons who were kept back from adopting Bigelow's operation because the great name of Sir Henry Thompson appeared against it. Dr. Freyer takes the opportunity afforded by the publication of his book to speak of the opposition of Sir Henry Thompson in a way which had proved too plain for the columns of the *Lancet*, which, publishing an article of his on the subject of litholapaxy, made such changes in it that the author describes it as "emasculated, and altered in such a manner that on publication it was scarcely known to the author." In the book before us he pays his debt at once to the *Lancet* and to Sir Henry Thompson, and sets down in clear, yet perfectly polite terms the truth in regard to the shortsighted opposition of the great English exponent of the operation of lithotrity to this new method, which even he has at length adopted. The steps of this opposition may be epitomized as follows: First, the proposition to use large instruments, and to complete the operation of lithotrity at one sitting was characterized as dangerous, and the instruments used were denounced as enormous and unwieldy, and as reminding Sir Henry of "the terrible engines used by Heurteloupe." Second, the originality of the idea was contested, and a claim made that Sir Henry himself had of late been doing something like Bigelow's operation. Third, the method of withdrawing the fragments by aspiration was belittled, and the apparatus recommended for this purpose was said to be only a modification of Clover's syringe, and in no sense an improvement upon it. The singular inconsistency of these opinions of Sir Henry Thompson is apparent on their face; their incorrectness has been demonstrated by experience, and by no one's experience more conclusively than by that of Sir Henry himself. To call attention to them does not seem to have been an especially agreeable task to our author, and in doing this he has kept entirely within the bounds of literary propriety and of general courtesy. But we share his opinion that it is right that it should be done, and his feeling that consideration for one surgeon should not require silence when injustice has been done to another. And, besides this, the temperate statement of such mistakes on the part of those who have become leaders in thought and practice has a salutary tendency to prevent their leadership from degenerating into despotism, and to support those who are *nullius addictus jurare in verba magistri*.

So much for the historical part of Dr. Freyer's book. In that in which he considers the merits and *technique* of the operation of litholapaxy, he is clear, interesting, and instructive. His experience has led him to offer some suggestions in regard to details of the operation which are sensible and likely to prove useful. In this connection it may be said that he has struck the happy mean in the citation of cases to illustrate his experience. There are none too many, and none too few. He has also called attention to what he calls "a new method of diagnosis of

stone." This consists in introducing a metal catheter into the bladder, and then injecting and aspirating a small quantity of water, in the hope that the current in the bladder will drive the calculus against the catheter, so as to produce an audible click. This method has been used with success in a number of cases by the author and by Mr. Harrison, of Liverpool. It was hit upon, as many good ideas are, by accident.

In regard to operations for stone in general, Dr. Freyer believes that litholapaxy is the operation for stones of moderate size, and even for those as large as three ounces, in adults. For children he prefers perineal lithotomy.

In conclusion, we can recommend this book as admirable in matter and in manner, and are happy to say that the share in its production borne by the publishers is appropriate to the excellence of its literary character. C. W. D.

UEBER DIE TOPOGRAPHISCHEN VERHÄLTRISSE DES GENITALE EINER INTER PARTUM VERSTORBENEN PRIMAPARA. Nach einem Gefrierschnitte geschildert von DR. H. CHIARI, Professor der Pathologischen Anatomie an der deutschen Universität in Prag. Wien: Toeplitz & Deuticke, 1885.

ON THE TOPOGRAPHICAL RELATIONS OF THE GENITALS OF A PRIMIPARA WHO DIED DURING LABOR. Drawn from a frozen section by PROF. CHIARI.

As is now well known, our knowledge of the actual mechanism of labor has received its most important additions from the frozen sections of parturient women by Braune and Chiara; more especially that of the former. In Braune's section the uterus is made up of two parts, apparently quite distinct. The lower is canal-shaped, about four inches in all its diameters, bounded below by the rim of the os externum, and above by a ridge known as Braune's ostium internum; at the level of this ridge a large vein is also cut in the anterior and posterior uterine walls—the circular vein. According to Braune, therefore, this lower tube was cervical, and all above it uterine proper. This, however, has been doubted by many, and in the absence of microscopical examination it could not be definitely held that the whole of this tube was cervical, and did not, in its upper part, belong to the lower uterine segment.

In the present atlas Dr. Chiari, of Prague (not to be confounded with Professor Chiara, of Milan), has published sagittal mesial sections of a phthisical woman who died during her first labor from pneumothorax. The sections drawn are: (1) Sagittal section mesial of the body, showing everything in section; (2) The right half of the section with the entire fœtus in position; (3) The left half with the entire fœtus in position, showing head in left occipito-anterior as rotated in second stage and membranes unruptured; (4) The right half; and (5) The left half of the body with the fœtus removed.

The interest of this contribution centres in the careful microscopic examination Chiari has made of what we may term Braune's cervical canal. In Chiari's section, it is seen bounded above by the circular vein, and below by the os externum. Two additional facts are, however, shown, viz.: (1) A white, wavy line, evidently produced in the mem-

branes, running round the uterus, practically at the level of Braune's ostium internum; and (2) Peristence of the arbor vitæ in the lowest zone.

Microscopical examination of a strip of the anterior uterine wall, reaching from above the circular vein as far down as the vagina, revealed the following facts:

(1) The white thickened line already alluded to, was found to be due to a special folding of the chorion and decidua.

(2) The decidua was found to line the upper four centimetres of Braune's cervical canal, with chorion and amnion, easily separable, superimposed. The decidua was here quite thin, and, at the upper end of the arbor vitæ, was reduced to a few cells.

(3) Four centimetres below Braune's ostium internum the true cervical structure began, and thus the cervical canal proper was in this case only about 2–3 cm. long. The lowest portion (0.6 cm.) was covered with squamous epithelium.

(4) The uterine muscle was thinned out below the level of the circular vein, and down to the level of the arbor vitæ seemed to consist chiefly of longitudinal fibres.

The condition of the posterior wall of Braune's cervical canal was the same in Chiari's case as that of the anterior.

In his section, therefore, Chiari found *the upper two-thirds of Braune's cervical canal uterine, and only the lower third cervical.* He believes the upper two-thirds of Braune's cervical canal to belong to the lower uterine segment, in this following Schröder.

The importance of this proof cannot be overrated. The contraction-ring or furrow felt in threatened rupture of the uterus is now known to be in the lower uterine segment, while the commonest rupture of the uterus is also in this segment, and not in the cervical canal. The further bearings of this will no doubt be discussed by Kürtner in relation to his decidua cervicalis, and Dr. Braune will, doubtless, give his opinion in the matter.

Some special points now come up. It is remarkable that the wrinkling of the membranes is found only at the level of the contraction-ring, and not all over the uterine cavity; the head is synclitic, and the bladder is an abdominal organ, as we have already shown.

The value of Dr. Chiari's contribution is evident, and deserves the hearty thanks of all interested in scientific obstetrics. The execution of the plates is not first-rate; and no sections have been made showing the ureter relation. The atlas remains, however, the most valuable contribution to the subject since Braune's work. D. B. H.

PRACTICAL CLINICAL LESSONS ON SYPHILIS AND THE GENITO-URINARY DISEASES. By FESSENDEN N. OTIS, M.D., Clinical Professor of Genito-Urinary Diseases in the College of Physicians and Surgeons, New York. New York: 1886.

THE present edition of this work is published by Professor Otis himself, owing to business embarrassments of the former publishers, and is intended to bridge over the hiatus between the first edition, which is

exhausted, and a second edition, which he has not had the time and opportunity to prepare; but which is promised in the near future. The rather pretentious title of the volume would imply that it was intended to be a complete treatise on the diseases of the genito-urinary organs; but this inference is emphatically disclaimed by the author. It seems to us that the term "The Venereal Diseases," would more accurately define the scope of a work which treats only of syphilis, chancroid, and gonorrhœa. Dr. Otis has been a frequent contributor to current medical literature, and his views are well known both at home and abroad. His most distinctive doctrines are in regard to the pathology of syphilis, the normal anatomy of the male urethra, and the treatment of stricture of the urethra; but he is a man of original ideas, and of great mechanical ingenuity, and the profession is his debtor in many respects.

The principal value of the work in hand is its practical clinical character. It is plain in language, but not particularly attractive in style.

The pathology of syphilis, as has been stated, is a subject upon which the author holds more or less distinctive views. He was one of the first to maintain that there is nothing mysterious or supernatural in the development of syphilis, but that it follows laws as definite as those of any other disease. In opposition to those who, like Billroth, believe that the "organism is infected at once," and that the disease is from the beginning "one of the blood," some intangible, mysterious principle having gained entrance into the system through the vascular apparatus at the moment of inoculation, Otis vigorously contends that the essential starting-point of the disease is a degraded cell or cells from a person who is suffering from syphilis. For the development of the disease, a breach of surface is requisite, to which the degraded cell gains entrance by direct inoculation. From this point it is taken up by the lymphatics and not by the bloodvessels, and now there occur a rapid cell growth and cell accumulation *in situ*, which constitute the induration of the sore, and about the same time the cells are arrested by the nearest lymphatic glands, which in turn become indurated and enlarged. Up to this time the process is a local one, the system has not been contaminated. Now the second incubation takes place, the cells are detained by the glands, but finally the proliferation increases to such an extent that the product is swept into the receptaculum chyli and thence into the general circulation. At this time secondary symptoms supervene. Notwithstanding the opinion of the author in regard to the disease being primarily local, he condemns as useless the excision of the initial lesion, as by the time the sore has become indurated, the glands will have become affected also. He believes that all the manifestations of syphilis are best explained by this theory of cell accumulation. and his views appear to be philosophical and correct. Applying these views to therapeutical methods, he says, page 116:

"Every variety of eruption . . . . occurring between the second and seventh months after syphilitic inoculation may be said to have its cause in a localized cell accumulation beginning in a papilla cutis. For the elimination of this, a gentle persistent mercurial treatment is indicated, not only as the result of clinical experience but from the fact that it is *the remedy, par excellence, for inducing the fatty metamorphosis through which alone the cell accumulations, occurring during the acute stage of syphilis, can be removed.*"

The usual term tertiary syphilis is dispensed with, as the lesions occurring at late periods after infection are regarded as sequelæ, which are

non-essential, non-contagious, incapable of being transmitted, and are preventable. He makes the statement that in an experience of more than twenty years he has never found a case in which the lesions of the tertiary stage have proved contagious. In regard to the diagnosis of the initial lesion, he says:

"In summing up the whole matter, we are forced to confess that a final decision in any given case is not warranted until some other evidence is presented besides the appearance and character of the local lesion."

This opinion, whilst held pretty generally at the present time, is nevertheless worthy of repeated reiteration.

It is worthy of note that Professor Otis is a firm believer in the curability of syphilis; and that under a persistent, long-continued mercurial medication in small doses, a cure is not only possible, but is to be expected. Syphilis is verily a more cheerful disease than it used to be.

The limitation of space compels us to omit notice of many points of interest, but we must pause a moment at the remarks on mediate contagion, page 291, as a source of urethritis. Who of us have not been gravely informed time and time again that the cause of the running was a complete enigma to the patient, unless he "caught it from a seat," and how often have we not assented to the possibility of this method of infection, simply as a placebo, to let the patient down easily, neither believing, nor being expected to believe the story? Dr. Otis now comes to the rescue of the above-mentioned prevaricators in these words: "I wish to state explicitly my conviction that gonorrhœa is occasionally contracted in this way." Copaiba and urethral injections are discarded by the author in favor of cleanliness, soaking the penis in hot water, and alkaline diluents, with a milk diet.

For the treatment of urethral strictures, dilating urethrotomy is recommended as being the only known means of effecting a radical cure. 2297 operations are reported without a death or permanent disability of any sort. We venture to think that the views of the author in regard to this operation are just a little too rose-colored. In this part of the world deaths have occurred, and strictures have recontracted; nevertheless the results are generally satisfactory. In conclusion, we heartily commend Dr. Otis's volume to the favorable consideration of our professional brethren.

R. W.

DISEASES OF THE DIGESTIVE ORGANS IN INFANCY AND CHILDHOOD, WITH CHAPTERS ON THE INVESTIGATION OF DISEASE, AND ON THE GENERAL MANAGEMENT OF CHILDREN. By LOUIS STARR, M.D., Clinical Professor of Diseases of Children in the Hospital of the University of Pennsylvania, Physician to the Children's Hospital, Philadelphia, etc. With colored plate and other illustrations. 8vo. pp. 385. Philadelphia: P. Blakiston, Son & Co., 1886.

AMERICAN medical literature will lose none of the prestige already acquired in the department of diseases of children by the little volume which heads this notice. Dr. Starr's "Diseases of the Digestive Organs in Children," does not, perhaps, contain a great deal that is new, but it is a clear, concise, and thoroughly accurate exposition of existing knowl-

edge upon the subjects discussed. Its distinctive features are the consideration of certain diseases not usually treated in text-books on pediatrics, and the attention bestowed on the child's daily regimen, diet, clothing, bathing, etc., upon which the successful management of the diseases of young people so largely depends.

The book contains 585 octavo pages, divided into three parts, which treat respectively of "The Investigation of Disease," "Diseases of the Digestive Organs," and "The General Management of Children."

The opening chapter is a carefully prepared essay on the investigation of disease, is replete with practical suggestions, and will amply repay careful reading. The several affections of the stomach and intestines are considered in detail in Chapter II., Part II. The author questions the existence of what is usually termed simple indigestion or functional dyspepsia, and attributes all forms of disordered digestion to a distinct tissue lesion. "This may be and usually is a simple catarrh, but it is none the less a lesion." He would also abolish the familiar terms, simple and non-inflammatory diarrhœa, and substitute acute intestinal catarrh, holding the opinion that this disease is not functional in character, but depends upon a "distinct, though passing lesion—a hyperæmia or catarrh of the intestinal mucous membrane."

Cholera infantum is believed to be an inflammation of the gastro-intestinal mucous membrane, but there is, in addition, some involvement of the sympathetic nerves, leading to the transudation of serum into the intestines, and to alterations in the temperature, respiration, and other functions. "The nature of this is paralytic, so far as the intestine is concerned, and resembles in its results experimental section of the sympathetic nerves." The lesion is due in part to direct over-stimulation by the irritant contents of the canal and in part to nerve exhaustion from great atmospheric heat.

Intussusception, which, apart from fecal impaction, is practically the sole cause of intestinal obstruction in infancy, receives the careful consideration which its importance demands. The author, however, lays too much stress upon constipation as a symptom of intussusception, or, at any rate, does not emphasize the fact that a diarrhœa occasionally continues throughout the whole course of the malady. According to Treves, constipation is not a marked feature of more than thirty per cent. of the cases. Opium and belladonna preferably administered by the rectum, in doses large enough to relieve pain and check intestinal peristalsis are the only drugs worthy of trial. Mechanical interference can only be successful before adhesions have formed; in general terms, efforts at reduction are contraindicated after the fourth day of the attack, and even earlier should there be much tenderness over the seat of lesion.

Dr. Starr thinks there is very little good to be expected from laparotomy, but, on the contrary, by its performance the chance of recovery from separation of the strangulated intestine is lost. The statement is made here that laparotomy has been invariably fatal in the case of infants less than a year old. This is incorrect. There are recorded three successful operations upon patients aged respectively six, seven, and nine months. The well-known case of Prof. Sands was published in 1877.

About thirty pages are set apart for the consideration of the diseases of the liver. These are less frequently met with in childhood than in adult life; however, congestion of the liver is very common after the third year.

Of the structural diseases, fatty and amyloid degeneration are the most frequent; syphilitic disease, cirrhosis, tubercular deposit, and parenchymatous inflammation stand next in the order named, while echinococcus is very rare, and cancer almost unknown.

Both mild and dangerous types of icterus neonatorum are described. The mild form occurs in babes born prematurely or partially asphyxiated, or in those exposed to the depressing action of cold and other noxious influences. The manner in which these causes act to produce the disease is not known. The grave type depends upon congenital malformation of the bile-ducts and gall-bladder; compression of the bile-ducts by syphilitic inflammation and growths, and umbilical arteritis and phlebitis.

Part II. closes with a chapter on "The Affections of the Peritoneum," in which are discussed peritonitis, tubercular peritonitis, and ascites.

Part III. takes up in detail the general management of children, and is one of the most interesting and instructive features of the book. The feeding of infants, to which everything else is subordinate, consumes the larger portion of the chapter, and the reader will here find detailed schedules of diet for all ages from the newly born to the babe of eighteen months. The author is very partial to a mixture of cream, milk, sugar of milk, and water, varying the proportions according to the age. Condensed milk is considered an unsafe food upon which to rear a child. Infants fed upon it alone, though fat, are pale, lethargic and flabby, have little power to resist disease, and are likely to drift into rickets before the end of the first year.

The farinaceous preparations so popular with the public are not only bad foods, but have both directly and indirectly a deleterious effect upon the processes of nutrition. Milk partially peptonized by pancreatin is spoken of in high terms.

On page 339 we read as follows:

"There can be no doubt, though the statement is a bold one and seemingly contrary to nature, that, taking the average, infants properly brought up by hand are better developed and enjoy more perfect health than those completely breast-fed. Of course, there is no artificial food equal to the natural—the sound breast-milk of a robust woman—and a child fed upon this must thrive, if other circumstances be favorable.

"Unfortunately, the woman who has sufficient health and strength to furnish an abundant supply of good milk during the ten or twelve months of normal lactation is unique in our day, and the great bulk of those who do nurse their children grow pale, thin, and feeble, and give milk, which though sufficient in quantity to fill the suckling's stomach and satisfy the cravings of hunger, does not contain enough pabulum to meet the demands of nutrition. Such mothers complain that their children are puny, peevish, and always ailing, and wonder why their neighbors' babies, fed upon the bottle, are so round, jolly, and healthy. The explanation lies in the simple fact that good cow's milk is a better food than bad breast-milk."

Everyone will yield hearty assent to the closing paragraph, but certainly they are few who will not enter a strong protest against the teaching of the above quotation as a whole. The mother who is able to furnish her babe sound breast-milk in abundance may be *unique* in the author's field of labor, but she assuredly is not unique in Ohio. Recognizing the inestimable value of the mother's milk both in preventing gastro-intestinal diseases and in promoting the child's welfare in every way, we seriously object to the promulgation of any doctrine which will lessen in the estimation of the profession or laity the importance of

breast-feeding. It is undeniably true that there are babes who thrive best when the bottle is substituted for the breast, but these instances are exceptional, and it is not safe to formulate a rule of action upon the exceptions. We agree with the author that in the majority of instances it is better to rely upon intelligent and careful bottle-feeding than on a hired wet-nurse, so great is the difficulty of procuring one with the requisite moral and physical characters. But when an acceptable wet-nurse can be secured and retained, it certainly adds largely to the child's safety, especially in the summer months. W. J. C.

PESTE DE CADEIRAS OU EPIZOOTICA DE MARAJÓ, SUAS ANALOGIAS COM O BERI-BERI. Pello DR. J. B. DE LACERDA. Rio de Janeiro, 1885.

HIP PESTILENCE, OR MARAJÓ EPIZOOTIC; ITS ANALOGIES WITH BERI-BERI. By DR. J. B. LACERDA.

DR. LACERDA, Director of the Physiological Laboratory in Rio de Janeiro, during a visit to the island Marajó, studied an epizootic prevalent there among horses and pigs, called "Hip Pestilence" or "Straddles," and concluded that it was the same disease as beri-beri. The symptoms are debility, unevenness of gait, dilatation of nostrils, shortness of breath. These are followed by great restlessness, staggering, and inability to control the movements of the hind legs. Dysuria occurs, but there is seldom pyrexia, sometimes there is paralysis, and sometimes dropsy, which may affect the head, making it swell like hydrocephalus, or the abdomen or hind quarters. Ulcers may appear on the skin, and in all cases there is great emaciation. The proportion of atrophic cases is twenty per cent., of paralytic sixty per cent., the remaining twenty per cent. being of a mixed or indefinite type. The duration of the disease is very variable, some horses dying in four days after the first symptoms have appeared, and some lingering for several months.

With regard to the individuals attacked, neither sex nor age appears to exercise much effect, but it is said that domestic horses are more liable to the disease than those which are allowed to roam about at pleasure.

Thirty-three autopsies were conducted on horses, twenty-two of which had died of the disease, and the remaining eleven having been killed. The blood was altered, being dark and viscous; the spleen, liver, and kidneys were dark, swollen, and softened; the bladder and omentum presented numerous ecchymoses.

The medulla was carefully examined, sclerosis variously diffused being found. A number of peculiar groups of cells were also found in the medulla, which appeared to be the generative organs of some species of ascomycetes; mycelium was also seen.

In the water of Lake Arary, in the island, a polymorphous microphyte was found belonging to the group Ascomycetes, and with this, both in its natural condition and also after passing through various cultivations, Dr. Lacerda inoculated rabbits, pigs, birds, and monkeys; producing in all a disease very similar to the "hip pestilence" affecting the horses in the island; the post-mortem appearances also being strikingly like those presented by the horses. The blood in the two cases was also examined

by cultivation methods, similar phenomena being obtained. The author thus deduces the theory that the epizootic "hip pestilence" is due to the microphytes contained in the water of Lake Arary. He then enters into the question of the identity of beri-beri with this epizootic, giving a long table of the symptoms in the two cases, according to which the similarity appears to be very great. He also compares the results of post-mortem examinations, and afterward touches on the prophylactic measures which should be adopted against this terrible disease, the etiology of which he has been at such pains to elucidate.

The pamphlet is enriched by two photographs of fowls which have been inoculated or beri-beridized, as the author calls it, and by numerous excellent engravings of sections of the medulla, both macroscopic and microscopic, spores, mycelium, cultures in Van Tieghen's cell, etc. Being, however, written in Portuguese, it will hardly command the attention it deserves, unless translated into some language more universally read by scientific men.

Recent Works on the Care of the Insane.

1. Handbook for the Instruction of Attendants on the Insane. 12mo. pp. 137. Boston: Cupples, Upham & Co., 1886.

2. How to Care for the Insane; a Manual for Attendants in Insane Asylums. By William D. Granger, M.D., First Assistant Physician, Buffalo State Asylum for the Insane, Buffalo, N. Y. 12mo. pp. 96. New York and London: G. P. Putnam's Sons.

The number of insane under treatment in the asylums and hospitals of the United States and Canada is estimated to be 53,000, and it may be stated that no less than 4000 attendants are employed in their care. The selection of attendants is usually delegated to the chief medical officer, and, if not trammelled in the performance of this duty, it may be assumed he will be governed by some policy and have some standard of qualifications to which all will be expected to conform. The insane are removed from the surroundings of home, the attendance of the family physician, that personal care which, under other circumstances, friends would prefer to render, and new environments come to surround the patient, of which the attendants and the quality of their service form an important part.

The relation which a hospital assumes is in the nature of a confidential guardianship, and the physician regards it as one enhancing rather than lessening his usual responsibilities. The patient is in frequent contact and companionship with the hospital agents or attendants, who at the same time that they render personal service, execute the directions of the physician, and thus to a certain extent exercise a discretionary control over the ward. As the physician is not at all times in his wards and depends upon his attendants for certain information, they become his trusted agents and, as has been observed, "his eyes and ears." Every physician, therefore, recognizes the necessity of training attendants for their responsible duties. As he estimates the elements of a successful administration of a hospital, he will attach the greatest importance to

the creation of a corps of attendants imbued with a spirit of kindly sympathy, an intelligent appreciation of the conditions of those under their charge, trained to implicit conformity to the printed rules and regulations usually prepared for its government. If, in addition, the attendant is impressed and influenced by high moral convictions of duty, by the dignity and nobility of his calling, the physician is soon surrounded and assisted by agencies as essential and valuable as his medicines, and indispensable as fine tools to the skilled mechanic. How a high degree of training may be best imparted to attendants is a pressing problem with every manager and officer of a hospital. Every hospital is a school for training attendants, and every superintendent aims, in his own way, to produce the Ideal Good Attendant, who, as Dr. Ray has observed:

"Elevateth his employment by the manner in which he performeth its duties. Though offensive to the senses, or trying to the temper, or exhaustive of patience, as many of them are, yet he meeteth them all faithfully and promptly. Like every true man and true woman, he findeth that dignity inherent in every good work that ennobles even the meanest service. As the good artisan rejoiceth over some choice specimen of his craft wrought by his own hand, so doth the Good Attendant rejoice when, after much toil and trial, he seeth the mind of his patient coming out from under the cloud.

The two books before us are the outcome of efforts to instruct and train attendants by oral lectures. *The Handbook for the Instruction of Attendants* was prepared in 1884 by a Committee of the British Medico-Psychological Association, of which Dr. A. Campbell Clark, of Glasgow District Asylum, was chairman. As Dr. Clark had undertaken with great success, as he reports, to instruct his attendants of both sexes by oral lectures two and a half years previously, it may be inferred that the *Handbook* embodies the substance of the lectures he then delivered. It was submitted to the Association and received its approval. Thirty-eight pages are devoted to "The Body: Its General Functions and Disorders;" twenty-seven pages to "Nursing of the Sick;" twenty-six pages to "Mind and its Disorders;" twenty-three pages to "The Care of the Insane;" and sixteen pages to "The General Duties of Attendants."

How to Care for the Insane is a manual for the guidance of attendants in asylums, and embraces the lectures delivered by the author, who "began, in October, 1883, at the Buffalo State Asylum, a course of instruction to the women attendants upon their duties and how best to care for their patients. This has been regularly continued till it has become a fixed part of the asylum life." The contents embrace lectures on "The Nervous System and some of its Important Functions," "The Mind and some of its Functions," "Insanity, or Disease of the Mind," "The Duties of an Attendant," "General Care of the Insane," "Care of the Violent, Homicidal, Suicidal Insane, and Those Inclined to Violence," "Some of the Common Mental States and Accompanying Bodily Conditions," "Common Accidents Among the Insane," "Treatment of Emergencies," "Services Frequently Demanded of Attendants."

We have inserted at some length the contents of these volumes, and it gives us pleasure to commend the books and the sincere efforts the authors have made to elevate the standard of hospital service. They show the scope of instruction that may be imparted to nurses. The work and object of the authors will also receive the commendation and co-operation of officers and managers of hospitals, State officers, and the profession. The acquisition of knowledge alone, without the ability to

apply it intelligently, or a moral principle to give it character, will, however, not result in the production of the Ideal Good Attendant. It must be borne in mind that many of the greatest reforms and advances in the care of the insane have been accomplished by medical officers through moral force, example, bedside instruction, practical rules for the guidance of attendants to which they have exacted strict compliance.

The subject of training and instructing attendants is receiving increasing attention, as is shown by the establishment of schools in the McLean Asylum, Buffalo State Asylum, oral instruction in the Boston Lunatic Asylum, State Lunatic Asylum at Utica, Pennsylvania Hospital for the Insane, and recent discussions in the Association of Medical Officers of English and American Asylums. It may be a question in what manner the systematic training of attendants can be accomplished, and whether instruction by lectures alone can be relied upon to effect the best results. In the opinion of Dr. Cowles, of the McLean Asylum, who has given much thought to the subject, and whose reports from 1880–85 may be profitably consulted in this connection, a foundation must first be laid by giving class instruction and teaching special bedside and ward duties under the direction of a superintendent of nurses after the manner of a general hospital, while the lectures by physicians may more profitably follow. In other words, the school is the result of a process of gradual development. The school of the McLean Asylum was formally organized in Nov. 1882, as the result of tentative preparation begun in 1880, and may be said to be the first of the kind in this country.

Some of the chapters in each of these books might have been omitted, as the matter is more appropriate for a professional reader. It will hardly satisfy the physician, and is beyond the capacity of the attendant. It is of little importance to instruct attendants in the philosophy of the human mind, the nervous system, its functions or disorders, or about the doses, use, and effects of medicines. More space might have been allotted to instruction in the simplest duties of the attendant and nurse, and we shall hope to see these suggestions followed in further contributions to this subject which are promised. J. B. C.

STUDIES IN PATHOLOGICAL ANATOMY. By FRANCIS DELAFIELD, M.D., Professor of Pathology and Practical Medicine. Volume II. Part 2. New York: William Wood & Co., 1886.

ALL interested in the subject of pathological anatomy will welcome the above evidence of the continuation of Dr. Delafield's studies. The part just published contains twenty-seven plates (xiii.–xxxix.), which illustrate the subjects of chronic phthisis and lobar pneumonia. The great variety of lesions of the respiratory tract which may occur in the former affection are fully indicated. An objection may be made to the application of the term miliary tubercle to what is commonly considered a nodule of pneumonia, shown in Plate xxxiv. The plate following it, however, deserves the highest praise as an exquisite drawing of a thoroughly characteristic tubercle.

The last four plates are intended to demonstrate that in certain cases of acute lobar pneumonia an intra-alveolar formation of connective tissue

takes place within a short time. It has long been recognized that certain cases of pneumonia which present the clinical characteristics of the acute fibrinous variety do not end in a typical manner. The violence of the symptoms is lessened during and after the second week, but the evidences of pulmonary solidification and of constitutional disturbance persist for weeks and months. In the fatal cases a diffuse hepatization, of a gray or reddish-gray color, is found, and the alveoli frequently contain plugs of vascular granulation tissue. Dr. Delafield is of the opinion that such a change may take place within a few days after the invasion of the inflammatory process. His strongest evidence in favor of this view is that presented by Case II. and seen in Plate xxxviii. The history of the case indicates a pneumonia of at least fourteen days duration. The drawing shows a vascularized plug of connective tissue within the air spaces.

Of the various illustrations included in the series, the reproduced microphotographs are the least satisfactory. The drawings by the author are admirable in every respect, and will serve a useful purpose to all students of histology. Their story is duplicated by a few pages of text, but is so well told that reference to the latter is hardly necessary to those familiar with the subjects treated. R. H. F.

BRIGHT'S DISEASE, AND ALLIED AFFECTIONS OF THE KIDNEYS. By CHARLES W. PURDY, M.D. Queen's University, Professor of Genito-Urinary and Renal Diseases in the Chicago Polyclinic, etc. 8vo. pp. 288, with 18 illustrations. Philadelphia: Lea Brothers & Co., 1886.

WE have before us a truly valuable book on the subjects treated; a book written modestly, yet with a confidence of assertion which shows that the author has himself handled cases and has studied them to some purpose, while he also exhibits a knowledge of the work of others. The volume claims to be a systematic, practical, and concise description of the pathology and treatment of the chief organic diseases of the kidneys associated with albuminuria. Such it is, including albuminuria, uræmia, acute nephritis, cirrhosis of the kidney, scarlatinal nephritis, lardaceous degeneration, and cyanotic induration of the kidney. It differs from most other works on the same subject in devoting a separate chapter to scarlatinal nephritis instead of considering it under the head of acute nephritis due to a special cause—the scarlatinal poison. Such an arrangement has in its favor the fact that especial attention is thereby attracted to a grave complication of scarlet fever which is too often lost sight of until it has established itself in the case. On the other hand, he who reads the chapter on scarlatinal nephritis and that on acute nephritis must necessarily read much matter twice over. It is a question, therefore, whether a separate chapter on scarlatinal nephritis is justified, since the disease may be said to give us the type of an acute nephritis.

It is not so with puerperal nephritis which, while not a distinct form of nephritis, is not nearly so constant in its morbid product and has not

a clinical history which can be regarded as typical for acute nephritis. The chapter is, therefore, well included.

Dr. Purdy abandons the terms parenchymatous nephritis and tubal nephritis, heretofore used to indicate that form of acute and chronic inflammation of the kidney in which the cells lining the tubules are the primary and principal seat of the inflammatory process; also the term interstitial nephritis, heretofore applied to the form in which the inflammatory process resides chiefly in the interstitial tissue, the tubules and their cellular lining being only secondarily involved. We incline to think that the author has come to regard this course as the best, because his studies, while they have included the morbid anatomy of the disease, have been rather more from the clinical standpoint. And although we admit it is not always easy to draw the line, clinically speaking, between processes that are parenchymatous and processes that are interstitial, yet so long as such differences exist the use of the adjective terms tends to greater accuracy. We do not overlook the fact that what is commonly called chronic parenchymatous nephritis is rarely confined to the parenchyma of the organ, and think it would be at once more accurate and less confusing to use the term chronic *diffuse* nephritis for this process. Although, too, the processes resulting in cirrhosis of the kidney may lack some of the features which are essential to inflammation, we still think that modern pathologists are correct in regarding them as inflammatory, and we therefore think that the terms chronic interstitial nephritis and chronic interstitial hepatitis are well retained, especially as there occur in both organs acute inflammatory processes, also interstitial, resulting in suppuration. We miss, too, our old friend the term "large white kidney," for one of the products of chronic nephritis, but whether this is an intentional omission or an accidental one we do not know.

To proceed to note systematically some of the features of the treatise, Dr. Purdy first takes up in Chapter I., Albuminuria, which he divides into (*a*) extra-renal or false albuminuria, and (*b*) renal or true albuminuria. Here we have at once a slight fault to find in behalf of accuracy, and that is with the term "false" albuminuria. What he calls "false" albuminuria is as much albuminuria as what he calls "true" albuminuria, the only difference being that the source of the albumen is not the same. The author does not place much stress upon the distinction of the imperfect albumens, peptone, and hemi-albuminose from true albumens, and in this we believe he is right. We are inclined to believe that the recent attempts to differentiate the tests between these substances, and between mucus and albumen have been in some respects rather confusing than otherwise.

The causes of albuminuria are put down as (*a*) alterations in the blood pressure, (*b*) changes in the vascular tunics, (*c*) degeneration of the renal epithelium, (*d*) alteration in the composition of the blood. Each of these causes is fairly discussed and its significance pointed out, and the conclusion arrived at, that aside from persistence or large amount of albumen in the urine, it is impossible to predict with any degree of certainty, from the character of the albuminuria, its relative degree of gravity. A very fair consideration is given to the various delicate tests for albumen which have recently attracted much attention, and of them Dr. Purdy regards as most sensitive the potassio-mercuric iodide, and picric acid; next in order, heat, ferrocyanide of potassium, and nitric acid in the cold.

The most reliable are the ferrocyanic, and nitric by Heller's method. He further makes this important statement: "I know of no test for albumen in the urine which, under some circumstances, has not misled the observer," whence the importance of submitting the urine, when doubt arises, to each of the five tests, and in testing urine for the first time to employ at least two tests.

In speaking of casts, attention is called to a fact which is constantly overlooked in practice, that they are rarely found in alkaline urine, being readily soluble in it. Hence the importance of having fresh specimens of urine for testing and in testing them promptly.

Passing, in Chapter II., to the important subject of uræmia and its causes, Dr. Purdy rejects all of the exclusive theories which would ascribe it to any single agency, but refers it rather to the combined action of several constituents of the urine. The temperature in acute uræmia, upon which there has recently been some discussion, is put down at from 101° F. to 105° F., and "the pupils may be dilated but never contracted." Among what may be regarded as novelties of treatment is the subcarbonate of iron in chronic uræmia, to which the author some time ago called attention in a paper, and attaches great value. He prescribes it in doses of twenty to thirty grains every three hours. It usually rapidly relieves the headache, nausea, and other symptoms, "possibly acting as an oxidizing agent on the effete material with which the blood is surcharged." His second method of modifying the uræmic influence is by simply diluting the blood by copious draughts of fluid, which not only renders the toxic agencies less harmful, but also favors filtration and diuresis. Dry hot-air baths are preferred to steam baths and to jaborandi for promoting sweating. Dr. Purdy fears the tendency of pilocarpine to produce œdema of the lungs, but this effect may be removed by the hypodermatic use of atropine in doses of $\frac{1}{100}$th to $\frac{1}{60}$th of a grain. Muscarine is another new remedy recommended for its action on the bowels and its stimulating effect on the pancreas, liver, salivary glands, and skin. Its dose is from one-eighth to two grains, and it may be given subcutaneously or by the stomach.

In Chapter III. acute nephritis is defined (p. 92) as "an essentially acute inflammation, involving the whole glandular structure or cortex." The changes in the connective tissue of the organ are comparatively slight, requiring more time for their development; yet even here the increased nuclei of young connective tissue-cells are sufficiently observable, especially around the capsule of Bowman. In the treatment of acute nephritis, rest to the inflamed organs and limitation of the damage to them are the principal indications. The former is accomplished by rest in bed, and dietetic measures which consist in the exclusion of nitrogenous food as far as possible. For the first three or four days plain water gruel made with arrowroot or barley meal. Even milk and bread are excluded at first, while turnips are admitted, as a part of the dietary of Dr. Aufrecht, but we think they are better omitted. Saline cathartics in moderation, with digitalis as a diuretic, and alkaline solutions, with a view to dissolving the obstructive plugs coagulating in the uriniferous tubules, are the drugs preferred. Citrate of potassium is the alkali preferred, in doses of from ℈j to ʒj, largely diluted, and repeated every two to five hours.

Chapter IV. is devoted to chronic nephritis. Passing directly to treatment, tannate of sodium, fuchsin, ergot, and tannic and gallic acids are recommended with a view to their effect in diminishing albuminuria

—we think with rather more favor than they deserve. Among the newer remedies is the fluid extract of adonis vernalis, which "in ten drop doses often adds remarkably to the action of digitalis," and "convallaria majallis may be substituted occasionally for either or both of them." Apocynum cannabinum is also spoken of as an efficient diuretic, and in these cases the author has known "it to stimulate enormously the secretion of urine, although in the doses requisite to obtain its more active diuretic effects it often produces sharp purgation, and even vomiting." The dose is from five to twenty drops of the fluid extract. Dr. Purdy has also used the chloride of gold in the late stages of chronic nephritis, in a number of cases with good results.

Passing on to cirrhosis of the kidney in Chapter V., epistaxis, occipital headache, diarrhœa, and cirrhosis of the liver, are symptoms named in addition to those more commonly mentioned. Dr. Purdy has noted that the stools in this form of diarrhœa are most frequent at night, corresponding in this respect with the largest passage of urine. The dyspnœa more or less characteristic of the advanced stages of the disease, is ascribed to three causes, nervous manifestation of uræmic origin, *œdema pulmonis*, and a dilated and weakened condition of the heart. With regard to the use of the nitrites which have come to be regarded as valuable remedies in relieving the high vascular tension characteristic of this disease, and the symptoms growing out of it, Dr. Purdy is satisfied that they are of great value. He prefers the nitrites of sodium and potassium to nitroglycerine, as they are less likely to produce headache, and their action continues much longer. They are given in doses of from three to five grains every four or five hours.

Scarlatinal nephritis is considered in Chapter VI. In speaking of the "smoky hue" of the urine in "scarlatinal nephritis," the author assigns a different cause from that commonly assigned to this symptom. He says it is owing to the presence of "undissolved urates and organic débris." We have always regarded it as the result of the acid reaction of the urine on a small amount of blood, the same bloody urine when alkaline usually becoming decidedly red.

Chapter VII., on puerperal nephritis, is a very useful one, and lardaceous disease and cyanotic induration are considered with sufficient fulness in Chapters VIII. and IX.

These are some of the points it has occurred to us to note in a careful perusal of this book—by which it may be said to be distinguished from existing works on the same subject. It will be seen that Dr. Purdy has enlarged the therapeutics of Bright's disease, the field in which we at present most need light, although some of the remedies suggested have yet to bear the test of time. He has unquestionably added to our knowledge of the subject, and English-reading practitioners everywhere will welcome his book. It is well printed in large, distinct type, by which the pleasure of reading is in no slight degree enhanced.

J. T.

A Manual of Practical Therapeutics. Considered with Reference to Articles of the Materia Medica. By Edward John Waring, C.I.E., M.D., F.P.C.P. London. Edited by Dudley W. Buxton, M.D., B.S. Fourth edition. 12mo. pp. xxix. 666. Philadelphia: P. Blakiston, Son & Co., 1886.

Since the first edition of this work appeared thirty-two years ago, it has met with well-merited favor. The third edition was published in 1874, and became out of print in 1880. The present volume differs somewhat in the arrangement of the contents from the preceding editions, and considerable matter has been omitted. Many new remedies have, however, been added, and the volume is presented in a more concise and convenient form. The book is essentially a "Practical Therapeutics." The space devoted to the consideration of the physiological action of drugs is short; though sufficient for the needs of most practitioners. The treatment of the therapeutical uses of drugs is concise, but thorough. The rules for the administration of different medicines, as of arsenic, mercury, opium, etc., and the indications for their use are excellent.

The articles on cocaine and antipyrin contain about all that is, at present, known of these interesting drugs. As an antipyretic, antipyrin is recommended to be administered in twenty-five grain doses every hour for three hours; and its hypodermatic use is also suggested. Sufficient caution is not given, however, regarding the dangers attending the use of antipyrin.

There are good articles on mineral waters, leeches, and pepsin; though the dose of pepsin, 2–5 grains, seems ridiculously small. It is, however, mentioned that Dr. H. C. Wood advises the use of much larger doses.

There is a useful discussion on the administration of salicylate of sodium in acute rheumatism. Thirty grain doses are advised every two hours until the temperature falls, and the administration of the drug is to be continued for a week or more after complete defervescence.

In conclusion, it can be said that we know of no book from which the medical student can better acquire a concise knowledge of practical therapeutics, than from the volume under consideration. C. B. P.

Vorlesungen Ueber Orthopædische Chirurgie und Gelenkkrankheiten. Von Dr. Lewis A. Sayre, etc. Zweite sehr erweiterte Auflage. Autorisirte Deutsche Ausgabe. Von Dr. F. Dumont. Mit 265 Holzschnitten. Large 8vo. xvi. pp. 396. Wiesbad: J. F. Bergmann, 1886.

Lectures on Orthopædic Surgery and Joint Diseases. By Lewis A. Sayre. Authorized German edition, by Dr. F. Dumont, etc.

Sayre's work on orthopædics is too well known and too well established to require comment in bringing to the notice of the readers of this journal the fact that it has recently been translated into German. We congratulate the author upon this evidence of the appreciation of his work which is felt in Germany, and the translator upon the excellent way in which the translation has been made. C. W. D.

QUARTERLY SUMMARY

OF THE

PROGRESS OF MEDICAL SCIENCE.

ANATOMY.

UNDER THE CHARGE OF

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The Short Muscles of the Thumb and Little Finger.

H. St. John Brooks finds that the outer head of the flexor brevis pollicis muscle most frequently receives branches from both the median and the ulnar nerves. The following table shows the variations in the nerve supply of this muscle in 31 dissections: outer head supplied by deep branch of ulnar alone, 5 cases; outer head supplied by ulnar and median, 19 cases; outer head by median, inner head by ulnar, 5 cases; outer head by median, inner head by median and ulnar, 2 cases.

The same anatomist shows, from a comparison of the muscles in a considerable number of mammals, and from their relation to the deep part of the ulnar nerve, that the muscle known as the flexor brevis minimi digiti in human anatomy, and the larger part of the opponens minimi digiti, are derived from Cunningham's superficial or adductor layer, while the ulnar head of the true flexor brevis is only represented by a part of the opponens beneath the deep branch of the ulnar nerve; the radial head of the flexor brevis forms the third palmar interosseous muscle. The so-called deep head of the flexor brevis pollicis is really a part of the adductor, and the proper ulnar head of the short flexor is the first palmar interosseous of Henle. The separation and reduction of some of their parts, shown by these muscles, is attributed to the pressure of the more developed long flexor tendons in the higher mammals.—*Journal of Anatomy*, July, 1886.

On the Central Connections of the Auditory Nerve.

Benno Baginsky has studied the origin and central course of the auditory portion of the eighth nerve in the rabbit by observing the degenerations following destruction of the cochlea in young animals. He contrived an operation by which the cochlea was completely destroyed, while the other parts of the labyrinth remained intact, and found that the resulting degenerative changes affected solely the hinder root of the auditory nerve, the anterior root being unaltered. The fibres of the posterior root are thus shown to have

no connection with the inner and outer auditory nuclei, but to spring in part from the anterior or accessory auditory nucleus and the tuberculum laterale of Stieda, and in part to course round the restiform body into the arcuate fibres of the medulla oblongata. Other fibres appear to pass through the corpus trapezoides to the superior olive of the same side. Having crossed the mesial plane the auditory fibres are found in the lower fillet of the opposite side, running to the inferior quadrigeminal and internal geniculate bodies, which are believed to be related to the auditory nerve in the same way as the superior quadrigeminal and external geniculate bodies are to the optic nerve. No changes were found above the mesencephalon in the cerebrum, or in the cerebellum and its inferior peduncle.—*Virchow's Archiv*, July, 1886.

On the Skin of the External Auditory Meatus.

The skin lining the deepest part of the external auditory meatus is generally described as presenting papillæ disposed more or less regularly in longitudinal rows. This statement is corrected by E. Kauffmann, who demonstrates that the prominences seen in frontal sections of the meatus are caused by fine ridges of the cutis, running transversely to the axis of the canal and parallel to the margin of the tympanic membrane. The ridges are most numerous on the floor of the meatus, less frequent in the roof, and disappear on the anterior and posterior wall. Only exceptionally are a few small papillæ found projecting from some of the ridges. The ridges first make their appearance between the fourth and fifth month of fœtal life, and they appear to become less marked in old age.—*Wiener Jahrbücher*, July, 1886.

The Adenoid Tissue of the Pituitary Membrane.

E. Zuckerkandl discusses the adenoid tissue of the nasal mucous membrane, of which he considers it a normal, although exceedingly variable, constituent in man. The occurrence of a scanty infiltration of the mucous membrane with lymphoid cells is regular, but masses of adenoid tissue, either in the form of diffuse infiltration or follicles, are exceptional.

The adenoid tissue is found most abundantly in the respiratory division of the nose, and especially in its hinder part. In the olfactory region the connective tissue of the mucous membrane contains interspersed lymphoid cells, but no follicles. Adenoid tissue, both diffuse and forming follicles, is well developed in the pituitary membrane of the dog, cat, sheep, pig, stag, and hare, in all of which follicles are more numerous and constant than in man.—*Wiener Jahrbücher*, July, 1886.

On the Position of the Pelvic Organs in the Female.

A. Waldeyer concludes, from his observations on some twenty nulliparæ between the ages of fifteen and thirty, that the normal position of the female pelvic organs is that described by His and B. S. Schultze. The uterus is inclined forward, resting against the bladder, and being more or less sharply bent at the level of the internal os according to the degree of distention of the bladder, the cervical portion is relatively fixed, while the body is freely movable. In no case was intestine found between the uterus and bladder; the recto-uterine pouch is occupied by a part of the sigmoid flexure, and less

frequently also by small intestine. The broad ligament is in the upright posture nearly horizontal. A deviation of the uterus to one side, more frequently to the left, is very common, and is probably a temporary condition. The flexion of the uterus is less marked in children than adults, depending on the relatively less capacious pelvis. The ovaries lie against the side wall of the pelvis, a little behind the middle of the ilio-pectineal line, having their long axis nearly vertical, the hilus-border directed forward and outward, and the surfaces looking inward and outward. The ampullary portion of the Fallopian tube forms a loop over the ovary, and the latter organ is almost entirely concealed by a curtain-like fold of the broad ligament.

The contracted bladder is in the adult entirely behind the symphysis pubis, and is much flattened on its upper aspect in comparison with the male organ. The ureters lie against the side wall of the pelvis close below the ovaries, very near to the hilus. The projecting fold of peritoneum which runs across from side to side over the empty bladder, and which is shown to exist also in the adult female, is named by Waldeyer *plica vesicalis transversa.*—*Anatomischer Anzeiger*, June 15, 1886.

J. SYMINGTON publishes some valuable observations, with figures, upon the position of the uterus and ovaries in the child, as ascertained by frozen sections. He finds that in the fœtus and newly born infant the whole of the anterior surface of the uterus is in close contact with the bladder, and that the axes of the uterus and vagina form a very obtuse angle, open forward. In a child of two months, in which the bladder was empty, the uterus was straight, and intestine lay in the vesico-uterine pouch. A mesial section from a child of fifteen months shows how the uterus is pushed backward by a distended bladder. In a girl six years old, the upper surface of the empty bladder is concave, and its posterior surface is in relation with the cervix of the uterus and the upper part of the vagina; the axis of the uterus is straight; in this case there is a considerable quantity of fluid in the lower part of the abdominal cavity, which has carried up the intestine away from the uterus. In a girl of thirteen years, the uterus is almost straight and strongly anteverted, being closely applied to the nearly empty bladder. The author believes that the view that the uterus is normally anteflexed in the infant is erroneous, and that it is less anteverted in the child than in the adult.

Concerning the position of the ovary, Symington agrees with Waldeyer, and points out that the organ is not normally fixed, but possesses a considerable range of mobility, alterations being mainly due to change in the uterine position. The uterus does not undergo any marked increase in size between infancy and puberty. The period at which the arbor vitæ disappears from the body of the uterus is variable; in one case it was still well marked at thirteen years.—*Edinburgh Medical Journal*, July, 1886.

MATERIA MEDICA, THERAPEUTICS, AND PHARMACOLOGY.

UNDER THE CHARGE OF

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A New Alkaloid—Hydrochlorate of Tulipiferine.

In the last quarterly issue (June, 1886) of the *Drugs and Medicines of North America*, a full account of *Liriodendron tulipifera*, in its botanical, chemical, and pharmacological aspects, is given. An alkaloid has been obtained from it by Prof. J. M. Lloyd, to which he has assigned the name *tulipiferine*. *Liriodendrine*, as Prof. Lloyd says, would be more in harmony with the present method of naming alkaloids, but unfortunately, Emmet, in 1831 (*Journal of Pharmacy*, p. 5), gave the name *liriodendrine* to the resin, under which name it has been, and still is, known.

Dr. Bartholow, of Philadelphia, in the same issue, reports a physiological investigation of the hydrochlorate of tulipiferine prepared by Prof. Lloyd. We give an abstract of this physiological study for such of our readers as may be interested in the revival of an old remedy, and familiar with the use, in domestic practice, of the bark of the tulip tree.

The alkaloid tulipiferine is not a very active substance, but it is by no means inert. An eighth of a grain of the hydrochlorate affects frogs, and one grain, rabbits. The results of its action in general are these: it causes paresis, muscular trembling, convulsions, partly clonic, partly tonic in character, heightened cutaneous and ocular reflexes, followed by stupor, increasing paralysis, and finally complete suspension of motility and sensibility. When, in frogs, all the phenomena of life have apparently ceased, if the chest be opened the heart is found in slow but rhythmical and sustained action. In one experiment this was found to be the case after twenty-four hours of apparent somatic death. As regards the nature of the action on the heart, it was ascertained that, as the effect of the alkaloid deepened, the vagus became less and less excitable on faradic stimulation, but it was not until the action reached its maximum that the nerve ceased to respond. The cardiac motor ganglia and the muscular tissue of the heart, however, continue responsive to irritation up to the period of physiological death.

As respects the action of tulipiferine on the peripheral nerves, it is found to lessen but never entirely destroy the irritability of the motor and sensory nerves. The muscles remain unaffected and contract on stimulation so long as any manifestations of vital action remain.

Tulipiferine, as the convulsive phenomena rather indicate (by removing inhibition), has some action on the brain. In warm-blooded animals a soporose state deepening into coma occurs from the exhibition of a full dose.

The physiological actions of tulipiferine indicate the possession of therapeutical properties by the bark of the tulip tree. In Rush's time it was reputed to be tonic and antiperiodic. It has, however, since been rarely employed except in domestic practice. During the late war Southern

physicians resorted to it as an antiperiodic owing to the scarcity of cinchona, yet it was not depended on alone, but combined with willow, dogwood, and other barks having similar properties. (Porcher, *Resources of the Southern Fields and Forests.*) From the physiological study we may conclude that liriodendrine will prove useful as a tonic, in cases characterized by cardiac weakness more especially.

The Physiological Action of the Peptones and Albumoses.

But a few years ago it was discovered by Schmidt-Mülheim that *peptone* injected into the veins of an animal causes deep narcosis, fall in the blood-pressure, and a condition like asphyxia. It was also found that it delayed the coagulation of the blood. Subsequent researches, especially by Kühne, brought to light the fact that the substance supposed to be peptone is really a mixture of peptones and albumoses. Such was the state of our knowledge on this subject when Pollitzer (*Journal of Physiology*, June, 1886, vol. vii. No. 3) undertook an investigation in the Physiological Institute of Heidelberg, to ascertain whether the effects attributed to peptones were due to them or to albumoses.

Pollitzer found that all the substances used in the experiments, excepting antipeptone—the peptones and albumoses—"exercised without fail a strong narcotic action." A stage of excitement lasting one or two minutes precedes the narcosis, which is like that produced by chloroform, and is very profound, but motility remains unaffected and the reflexes are not abolished. The peptones, except antipeptone, and the albumoses have, in varying degree, the property of retarding, sometimes of preventing the coagulation of the blood. They all lower the blood-pressure remarkably. It has been suggested that the narcosis is due to anæmia of the brain, since it lasts only so long as the blood-pressure is below normal. This lowering of the vascular tension is due to vasomotor paralysis, and this chiefly in the splanchnic region, as is shown by the extreme congestion of the mesenteric vessels. Although this subject is a physiological one, it is probable that these facts will have an important relation to certain therapeutical problems.

Milk and its Therapeutical Applications.

Apropos of peptones, it may be useful to our readers to present a brief synopsis of Dujardin-Beaumetz's views regarding milk and its therapeutical employment. In his "Therapeutic Conferences," now in course of delivery at the Cochin Hospital (*Bull. Gén. de Thérap.*, July 15, 1886), he offers some practical suggestions which, although not new, may, nevertheless, be useful to many. As regards the contamination of milk, he holds that medicaments and poisons contained in plants pass in great part into the milk. In this way the alkaloids of the solanaceæ may render milk poisonous. That iodide of potassium and the iodides generally, salicylic acid, arsenic, etc., may thus contaminate the milk of nursing mothers is certain. Brouardel and Pouchet have communicated to the Medico-Legal Society an instance in which the death of an infant was occasioned by arsenic in the milk of the mother, who was taking large doses medicinally. Syphilized infants have been treated through the milk with mercury by administering mercurial

preparations to the nursing mother. In this way also quinine has been successfully given to an infant suffering from intermittent fever.

If medicaments may be thus transmitted, why not the poisons of typhoid, tuberculosis, and syphilis? As regards the typhoid poison, he thinks the water added to the milk is the vehicle rather than the milk itself. There can be no doubt that the bacilli of tuberculosis are contained in the milk of tuberculous cows in large numbers, but it is not proved that in this way the human subject is affected.

Dujardin-Beaumetz then passes in review various milk products, as whey and cheese, and next considers certain drinks obtained by fermentation. *Kefyr* is prepared in the mountains of Caucasus, and consists of cows' milk which has undergone fermentation by the addition to it of *kefyr grains*, which consist of a microbe—*dispora Caucasica*—that has the remarkable property of transforming lactose of milk into alcohol and carbonic acid. *Oïdium lactis*, on the other hand, changes lactose into lactic acid merely.

Under the name *Galazyme*, Schneep has described a fermented milk which is prepared by the addition of sugar and a special ferment. Various modifications of this process have been proposed, consisting for the most part in the addition of different kinds of sugar and brewer's yeast. The *koumiss*, so-called, which is now so commonly dispensed in this country, is nothing more than Schneep's galazyme.

The fermented milks are usually well borne, especially by the stomachs of chronic alcoholics. By reason of the presence of alcohol and lactic acid they possess tonic and digestive properties; the carbonic acid lessens pain and vomiting.

Our author makes some interesting observations on the administration of milk in various diseased states. The quantity to be given daily ranges from 2 to 3 litres (67 to 101 fluidounces). Mautel has shown that 3 litres suffice to maintain the nutrition at the normal; below that amount the weight declines. As regards digestibility, it is found that 500 grammes (nearly 1 pint) pass out of the stomach in an hour. Reichmann's results (*Zeitschrift für klin. Med.*, 1885, vol. ix.) differ from those arrived at by Dujardin-Beaumetz, for the former asserts that 300 cubic centimetres require three hours to pass out of the stomach into the intestine. These two observers are also opposed as respects the relative digestibility of boiled and crude milk, Reichmann maintaining that boiled milk is the more digestible, and Dujardin-Beaumetz that there is really no difference. Pinard asserts that prolonged boiling favors the digestion of milk by peptonizing it in part.

As a diuretic milk is a valuable remedy in cardiac dropsy. As both an aliment and a diuretic it is much used in the treatment of catarrhal and interstitial nephritis. Easy of digestion, making little demand on the resources of the stomach, and promoting digestion by the formation of lactic acid, it is an important remedy in ulcer of the stomach, gastric catarrh, gastritis, etc. Having constipating properties, it is exceedingly useful in the treatment of diarrhœa and dysentery.

Dujardin-Beaumetz does not accept the view of Donkin that sugar of milk is not contraindicated in diabetes. Of other objections to its employment, he mentions dilatation of the stomach, in which it is objectionable by reason of its bulk; and in certain cases of acidity of the stomach, in which it is not well borne.

Antipyrin.

Dr. Blanchard (*Revue Méd. de la Suisse Romande; Revue de Thérap.*, July 1) has studied the effects of antipyrin under various conditions, and has reached the following conclusions:

In acute articular rheumatism, it affords relief as completely and more rapidly than does the salicylate of soda; but the dose necessary (four to six grammes—sixty to ninety grains) often produces erythema, but no other symptoms of intolerance. In the acute pneumonia of the adult, its effect has been slight, almost *nil;* in the infant, on the contrary, its good effects are often very manifest, and in general its administration is followed by prompt improvement. Dr. Blanchard has also frequently prescribed it in chronic bronchitis when an accession of high temperature has aggravated the existing condition, with the result that one to two grammes (fifteen to thirty grains) will bring the febrile movement to an end by the termination of the second day. In most of the anginose affections, except the suppurative and diphtheritic, the results of the administration have been the same: the fever soon ceases, and, although the disease proceeds on its usual course, the headache, the anorexia, and other unpleasant symptoms belonging to the fever, disappear. In ephemeral fever, influenza, gastric fever, and similar affections, a single dose of antipyrin (fifteen to thirty grains) suffices to dissipate all the *malaise.* In typhoid its action is purely antipyretic, and the results of its administration are much less satisfactory than the treatment by baths.

Treatment of Typhoid Fever by Corrosive Sublimate.

In a recent issue of the *Berliner klinische Wochenschrift*, M. Greifenberger proposes the use of corrosive sublimate in the treatment of typhoid fever, instead of massive doses of calomel. He employs this remedy instead of calomel, because of its antiseptic property, and with the view to avoid the too active purgation followed by hemorrhage, which is one of the risks of the latter. He gives the sublimate in solution, in the dose of two to three milligrammes (one-twentieth to one-thirty-second grain), the one-twentieth grain being the maximum. He also finds it useful sometimes to give a weak infusion of digitalis, or morphine may be added to the sublimate solution, according to the indications. The treatment should be continued until the temperature remains at the normal for several consecutive days, and the general state is improved. The evacuations are regulated by castor oil or compound infusion of senna. Greifenberger has never observed any ill results from the use of corrosive sublimate, such as vomiting, abdominal pains, salivation, etc. Of forty cases thus treated, none proved fatal. At the same time, in another series of thirty patients, treated by attempts to jugulate the disease, and by the expectant method, there were three deaths from complications. These results are to be compared with the mortality from typhoid in Berlin, which was 15.9 per hundred.

If these results be confirmed by further experience, the treatment by corrosive sublimate will be a distinct advance. The use of castor oil, especially of compound infusion of senna, will hardly be approved by practical physicians on this side of the ocean.

Another Method of Treating Typhoid.

Dr. Robin, in a paper recently read before the *Société Médicale des Hôpitaux*, of Paris, criticised the present antipyretic method of treating typhoid fever, and proposed a new one, which is applicable to all typhoid states. He holds that the chief danger is the accumulation of unoxidized materials in the organism, and he proposes, by the employment of medicaments which have the power to combine with this nitrogenous residuum, to render it soluble and cause its excretion. The medicines having this *solubilizing* property are especially salicylic and benzoic acids, which, combining with the nitrogenous radicals such as glycocoll, pass into the urine in the state of salicyluric and hippuric acids. In some preliminary investigations Robin ascertained that the administration of these remedies lessens the excretion of urinary solids and of urea, but this result does not mean that they lessen the activity of the combustion process; only that they combine in part with the combustible bodies.

Dr. Robin does not offer any statistical or clinical evidence of the value of the method proposed by him. Admitting the importance of the suggestion, it is not necessary to travel so far in search of an explanation of the utility of salicylic and benzoic acids. Both possess germicide properties and are antipyretic. May not any value they may have in typhoid fever be due to the destruction of the typhoid germ, and to the arrest of the metabolism set up by these bodies? When, however, remedies can be submitted to the *experimentum crucis* of comparative trials, is it not wiser to settle their relative claims in this way, than indulge in endless speculation regarding their *methodus medendi?*

Contribution to the Study of the Ferruginous Preparations employed Hypodermatically.

Dr. Hirchsfeld has made the hypodermatic injection of iron preparations the subject of an elaborate essay, historical, physiological, and therapeutical (*Bull. Gén. de Thérap.*, July 15, 1886). In his historical summary, which is quite complete, he has not overlooked the contributions of Americans, and has referred to the paper of Da Costa. The first experience in this practice was that of Rosenthal, of Vienna, which was made in 1872. Since that time numerous observations and experiments have been reported, on the whole favorable to the practice. But Hirchsfeld says: "Our results and conclusions do not coincide with those of the partisans of the hypodermatic method. We entered into the investigation without preconceived ideas, and we publish our conclusions as they were reached." The most important fact disclosed in the investigation thus far published, is the following:

"On examination of the blood, the number of red globules had sensibly diminished—a fact which had previously been observed both in men and in animals as a result of the hypodermatic injection of iron."

No conclusion has been reached as to the preparation most suitable for administration subcutaneously. The preparation of Rosenthal has been used more frequently, probably, than any other. This is obtained by dissolving the pyrophosphate in a solution of citrate of soda. In a half hour after the injection of this salt, iron may be detected in the urine.

The Use of Cocaine in the Treatment of Venereal Diseases.

Bono's experiences (*Gazette delle Cliniche; Revue de Thérapeutique*, July 1, 1886) in the use of cocaine in affections of the genito-urinary apparatus have some practical value, and we therefore lay before our readers a synopsis of them.

An injection of a two per cent. solution of cocaine arrests completely the soreness and painful erections of acute gonorrhœa. The injection should be retained in the urethra for about five minutes, and be repeated four or five times a day. This application of cocaine is also an unequalled means of preventing the suffering caused by caustic injections and the introduction of the catheter. The cutting pains attendant on gonorrhœa in the female invariably yield to the application of a two per cent. solution on a small tampon, or of a pomade five per cent. in strength.

The application of a cocaine solution facilitates the examination of the urethra or bladder by the bougie or endoscope, and prevents the pain of cauterizations, excisions of primary sores, and the destruction of condylomata by caustic or cautery.

Cataract Caused by Naphthalin.

At a recent session of the Paris Academy of Medicine (*Revue de Thérap.*, July 15, 1886) MM. Bouchard and Charrin presented two dogs in which cataract had been induced by the internal administration of naphthalin. In five dogs cataract formed after some days' administration of this agent in the proportion of eighteen to twenty-four grains daily per kilogramme of the animal's weight. Although this quantity is about five times greater than that given to man, the fact indicates the necessity for caution in the use of such a substance. Moreover, the production of cataract in this way is eminently suggestive from the pathological point of view.

The Consumption of Alcohol in France.

At a session of the French Academy, reported in the same issue of the *Revue de Thérapeutique*, quoted above, the subject of the consumption of spirituous liquor in France was discussed, *àpropos* of a report made by a special commission instituted by a resolution of the Senate. The report demonstrates an extraordinary increase in the use of spirits by the French people. In forty years the consumption of spirits has doubled, and this increase coincides with a diminution in the production of wine. The alcoholization of wines appears to be carried on to a great extent, and in this direction, largely, the increased use of alcohol takes place. The commission declares that this strengthening of wines is highly injurious from the hygienic standpoint, and they recommend that the importation into France of fortified wines be forbidden.

This question is also an important one for the physicians of the United States who have occasion to prescribe French and other foreign wines. It is no doubt true that wines bear much better the ocean voyage if "fortified;" but if their alcoholic strength is thus increased, they have a different character from that possessed by them in their natural state. We learn an important lesson also, hygienically, in the experience of the French people, who have had in genuine wines of good quality, the most influential temperance promoter.

Gelosin—A New Excipient and Vehicle.

In the issue of the *Bull. Gén. de Thérapeutique* for July 15, 1886, Guérin, pharmaceutist, describes a new and apparently valuable product for various pharmaceutical uses. It is an amorphous, uncrystallizable, colorless, and non-nitrogenous substance, similar to *lichenin*, obtained from lichens, to *fucin* of the algæ, and to *pectose* of fruits, which causes their gelatinization. *Gelosin* is a mucilaginous principle which is extracted from some of the Japanese algæ. It dissolves in hot water in the proportion of 550 times its own volume, and on cooling forms a beautiful transparent jelly, which may be made to take any form, and its consistence can be varied to suit. It will take up all medicinal substances soluble in water alone, or made so by the addition of alcohol, glycerin, acids, or alkalies. Amongst the great number of applications to which it may be devoted, are the making of poultices, vaginal or urethral suppositories, cylinders or plates of variable thickness, impregnated with active medicinal substances, etc. It undergoes a continuous retraction, by which its medicinal contents are slowly expressed until the jelly is finally completely desiccated.

Piliganine

Is the title of a new alkaloid obtained from Peligan, a plant having some resemblance to lycopodium. A specimen of the plant was sent by Dr. Moncaro, of Brazil, to Dr. Dujardin-Beaumetz, and a chemical investigation was made by Dr. Bardet, Chief of the Pharmacological Laboratory of the Cochin Hospital. (*Revue de Thérapeutique*, July 15, 1886.) An acrid resin and an alkaloid—piliganine—were isolated by Dr. Bardet. The alkaloid was found to be an active poison possessed of powerful emeto-cathartic properties. Further investigations are needed to determine the place of this new alkaloid as a therapeutical agent.

Salol, a New Antiseptic and Antirheumatic.

Dr. Sahli (*Centralblatt für die gesammte Therapie*, July, 1886) has produced a new phenol compound, in which an ether takes the part of a base. This substance is a salicyl acid phenol; it is a whitish powder, has a somewhat aromatic odor and but little taste, is not soluble in water but is soluble in alcohol. Its physiological action resembles that of salicylate of sodium. It is found in the urine, giving it a blackish hue like carbolic acid, and a peculiar odor. It is a decided antipyretic, and for this purpose the dose is from two to four grammes (thirty to sixty grains). In the various rheumatic affections it has acted efficiently. A case of chronic urticaria that had resisted other treatment yielded to salol. Dr. Sahli finds it indicated in diabetes, intestinal catarrh, typhus, cholera, etc., and in the treatment of wounds and injuries it may be substituted for iodoform.

MEDICINE.

UNDER THE CHARGE OF

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THE ETIOLOGY AND CURABILITY OF PERNICIOUS ANÆMIA.

It would be an error to say that only those are cases of pernicious anæmia which actually end in death. Moreover, the causes of certain forms of the disease have been discovered, and REYHER (*Deutsches Archiv für klinische Medicin*, Bd. 30, H. 1 and 2, 31–69) reports a series of really remarkable cases, in which the cause was clearly the presence of bothriocephalus latus. All of the patients had, at some time in their lives, evacuated portions of the parasite. Although some were in a desperate condition when treated with felix mas., yet almost immediately after the expulsion of the worm very marked improvement set in, which rapidly advanced to complete recovery. The symptoms more particularly examined were as follows: There was the most profound anæmia, with great and steadily increasing debility, unaffected by any tonic treatment, and which would almost certainly have terminated fatally, had not the cause been discovered and removed. No explanation for this condition could be found in the external surroundings; no structural or functional changes in any of the organs could be detected, except diarrhœa in certain patients; fever was present at times in many cases; there was no loss of adipose tissue; retinal hemorrhages occurred in several instances, and the symptoms of intense cerebral anæmia existed. All these are the characteristics of the progressive pernicious anæmia of Biermer, and the cases cannot but be considered as instances of this disease produced and favored by the presence of bothriocephalus latus.

As regards the condition of the blood, the author observed an absolute diminution in the number of corpuscles, and the presence of numerous small, highly refracting, granular bodies. The red blood-cells had ceased to lie in rouleaux; were often larger than normal, or of irregular form. He was unable to confirm any of the observations made by others, except that he saw in one case the small red bodies described by Eichhorst.

As to the etiological connection of pernicious anæmia with bothriocephalus latus, it has been proved that the "brickburners' anæmia," the "disease of the Gotthardt tunnel laborers," and some other affections, all similar to Biermer's "pernicious anæmia," are occasioned by the presence of ankylostomum duodenale or allied parasitic worms. It is certainly reasonable to suppose that bothriocephalus latus may in certain cases produce the same symptoms, as its favorite abode also is the small intestine.

How the injury is accomplished cannot yet be explained. It is possible that the bothriocephalus may sometimes fix its suction apparatus directly

upon a bloodvessel, as does the ankylostomum; or some infectious matter may be introduced through the worm into the circulation. The author believes that any alterations of the red blood-cells which may exist must be the effect of the disease; for, were they the cause, so immediate an improvement of the symptoms would not follow the expulsion of the parasite.

Reyher thinks it possible that the existence of helminths may have been the cause of many of the cases of pernicious anæmia reported by various writers, and that the presence of the parasite was either overlooked at the autopsy or no importance laid upon it.

On the Operative Therapeutics of Basedow's Disease.

Hack reports (*Deutsche med. Wochenschrift*, June 24, 1886) the case of a patient who presented the usual symptoms of Basedow's disease, and, in addition, suffered from a permanent obstruction to respiration through the nose. Examination revealed extreme hyperplasia of the erectile tissue of the middle and lower turbinated bones. Operation on the right side was followed on the next day by an almost total disappearance of the exophthalmus of this side. A similar, though not so marked, diminution occurred in the left eye after the left side was operated upon.

On reëxamination several months later, it was found that an injection of the conjunctiva, which had at frequent intervals occurred, appeared much less often; the nervous palpitation had disappeared, the dilatation of the heart grown less, the goitre diminished in size, and an impaired sharpness of vision greatly improved.

Adopting the hypothesis that a neurosis of the sympathetic is the cause of Basedow's disease, Hack accounts for the recovery in this case on the ground that the seat of the disease lay in a permanent irritation of the peripheral filaments of the sympathetic in the nose. The symptoms, then, were vasodilator reflexes, by which the cardiac vessels and ganglia, the orbital expansile adipose tissue, and other parts affected, received too great a supply of blood. And operation upon the hyperplastic tissue was of benefit, just as it is in other reflex neuroses of the sympathetic, such as certain forms of asthma and of migraine.

Diabetic Hemiplegia.

R. Lépine and L. Blanc publish (*Revue de Médecine*, No. 2, 1886) an interesting case of diabetes mellitus, in the course of which right-sided hemiplegia developed. The patient, æt. thirty-nine, entered the clinic September, 15, 1881. He had been in good health until November, 1880, when suddenly symptoms of diabetes set in. The patient was then passing about 525 ounces of urine, and from 22 to 25 ounces of sugar daily. Under treatment the daily quantity of urine was reduced to 245 ounces.

Shortly after this amelioration the patient began to notice a feebleness in the right upper and lower extremities and right side of the trunk. This progressed so rapidly that in fifteen days there was complete right-sided hemiplegia. Simultaneously with the appearance of the hemiplegia, convulsions of the right side, including the right side of the face, set in. The convulsions recurred every four or five hours and lasted for five or six minutes. The

intelligence remained normal during the crises. Three weeks after the onset of the above symptoms embarrassment of speech was noticed. The convulsive seizures ceased ten days after admission into the hospital (Sept. 25), but the aphasia, which was complete, continued until the middle of October, at which time the patient could distinctly say "oui," "non." At the time of admission the intelligence was much lowered, the patient seemed demented. From this on improvement set in, and in the beginning of the year 1882 the state of the intelligence and hemiplegia had undergone a very marked improvement, but pulmonary phthisis now made itself manifest, and carried off the patient on the 22d of December, 1882. At the autopsy the brain showed no lesion perceptible by the naked eye. It was preserved in chromic acid (3 : 1000) for several months, and the liquid was renewed every eight days for the first few months. The brain was then examined with the microscope in sections. The left hemisphere showed an almost complete absence of the pyramidal cells, only a few triangular and small irregular cells could be seen. The neuroglia had undergone considerable change, its cellular elements were less numerous; it had lost its grained aspect, and appeared for the greater part made up of trabeculæ. The capillaries were found dilated. The right hemisphere was normal in every respect.

On the Pathology of Multiple Neuritis and Alcohol Paralysis.

Oppenheim (*Zeitschrift für klinische Medicin*, Bd. xi. H. ii. and iii. S. 232–262) gives several instances of multiple neuritis produced by alcoholism, although "taking cold" was the exciting cause in some cases.

The symptoms consisted in partial paralysis, usually confined to the lower extremities, with more or less degeneration of the muscles, perceptible rather to the hand than to the eye. There was also diminution of the electrical excitability with the reaction of degeneration. More or less pain, frequently with great tenderness on pressure; incomplete tactile anæsthesia, usually limited to the feet and legs; hyperæsthesia to heat and painful impressions, and paræsthesia were marked features. The gait was atactic-paretic, growing worse when the eyes were closed. The patellar reflex was abolished. This symptom frequently persisted long after the patients were in other respects well.

The cranial nerves were unaffected, except those supplying the muscles of the eye. Diplopia, paralysis of the accommodation, nystagmus, and immobility or sluggishness of the pupil were sometimes present. Implication of the optic nerve has been described by others, but was absent in Oppenheim's cases.

The disease resembles tabes dorsalis in some particulars, but the diagnosis is usually not difficult. In the cases under observation the pain was not so severe as in tabes; there was no girdle-pain, and never analgesia. There was always more or less paralysis, and usually disturbances of the electrical excitability.

The therapeutics of the disorder consist in the use of warm baths, and later of electricity. The avoidance of alcoholic drinks is essential and usually insures recovery, although this may be long delayed.

Peripheral Neuritis in Phthisis.

MM. Pitré and Vaillard contribute an extensive article (*Revue de Médecine*, No. 3, 1886) on the peripheral neuritis frequently met with in phthisis. The neuritis, they say, may exist while the brain and cord, and their membranes, show no evidence of disease. The disease of the nerves, therefore, cannot be secondary, but must be primary. Clinically they recognize three groups:

I. Latent peripheral neuritis, which runs its course without manifesting any disturbance. The clinical notes of two such cases are reported. Histological examination of several of the nerves showed a segmentation of the myelin into masses and partial atrophy of the sheath.

II. Amyotrophic peripheral neuritis. This form is characterized by a diffuse paralysis, which is rapidly followed by muscular atrophy. It has a very close resemblance to subacute anterior myelitis. But a post-mortem examination reveals a healthy cord and membranes, and parenchymatous neuritis. Six cases belonging to this group are collected from recent medical literature, and a *résumé* given of each. They all presented features closely resembling subacute anterior myelitis, but were distinguished from it by one important phenomenon. This was the existence of some form of sensory disturbance, such as neuralgic pains, anæsthesia, hyperæsthesia, loss of muscular sense, etc., concurrently with the paralysis or preceding it for a shorter or longer period.

III. Peripheral neuritis with disturbances of sensibility predominating. Few consumptives escape without having sensory disturbances at some time during their illness. These have various causes, some of which are gross lesions of the cord, meninges, or of the nerves themselves. Virchow has observed a case in which a solitary tubercle occupying the lateral column of the cervical cord caused a brachial neuralgia of the corresponding side. But in the cases falling under this group there is no other lesion of the nervous system than a parenchymatous inflammation of the peripheral nerves. Four such cases are narrated in full. The authors make the following conclusions:

1. In the course of tuberculosis, as in other infectious diseases, it is not rare to find the peripheral nerves the seat of parenchymatous changes presenting the characters of degenerative neuritis. 2. These changes develop primarily, and do not depend upon a preëxisting lesion of the brain or cord. 3. The pathological changes may involve indifferently the sensory, motor, or mixed nerves. They may equally attack the cranial nerves (optic, oculomotor nerves), pneumogastric, phrenic, etc. 4. The symptoms of these affections are very variable, and are still imperfectly known. On comparing them, however, the three clinical divisions above described will be readily distinguished. 5. The frequency of peripheral neuritis in consumptives, the variability of its distribution and symptomatology, explain the polymorphism of the nervous troubles observed in phthisis.

An Unusual Form of Progressive Muscular Atrophy.

Charcot and Marie (*Revue de Médecine*, No. 2, 1886), in an elaborate article, accompanied by several photographs, treat of an unusual form of progressive muscular atrophy.

The disease begins in the most distal parts of the inferior extremities, and gradually extends up the legs. The muscles of the thigh remain intact for a long time. Paralysis sets in at about the same time as does the atrophy, and keeps pace with it. The muscles of the upper extremities never become affected until a long interval elapses after the disease has attacked the inferior extremities. The intrinsic muscles of the hand are the first of the muscles of the superior extremity which become involved. From these the atrophy and paralysis pass gradually to the muscles of the forearm and arm; all the other muscles of the body remain absolutely intact. Though the affection may be said to progress symmetrically, the disease is usually more pronounced on one side. Fibrillar contractions are observed in most of the affected muscles. The excitability of the muscles by percussion is not increased; on the contrary, it is diminished, and disappears long before the loss of function and atrophy become complete. The tendon reflexes comport themselves much in the same way. An electrical examination could be carried out in only three of the subjects. In the most advanced state of the affection the muscles showed absolute inexcitability to both currents. In the muscles considerably altered "the reaction of degeneration" obtained; and, lastly, in the muscles slightly affected there was only a slight diminution of the electrical excitability. Vasomotor disturbances were manifest in a bluish or reddish discoloration of the skin of the affected members. The temperature was lowered; in four of the cases the sensibility was absolutely intact. In the fifth case there was anæsthesia to pricking and temperature, most marked in the soles of the feet. Another noteworthy feature in this case was the presence of pain, which, however, continued for only the first two years after the onset of the disease. The general condition may be said to offer nothing special of note; the patients enjoy good health. It may be of interest to mention the fact that the patients are constantly changing their position, so as to retain their equilibrium. The disease begins generally in infancy or in adolescence. In Charcot and Marie's five cases, three were three years, one was fourteen years, and one was fifteen years of age. Of nineteen cases observed by other authors, fourteen showed the affection before the age of twenty-two. The disorder seems to have a predilection for the periods between three and four years and fifteen and sixteen years. It may, however, occur later in life. Eichhorst had a case aged thirty-six years, and Wetherbee one aged thirty-nine. Heredity plays a very important *rôle* in the causation; but three of the authors' cases showed no hereditary taint whatever. Taking all the features into consideration, the authors think that these classes of cases belong to the myelopathies rather than to the myopathies. The clinical reports of similar cases to the authors, nineteen in number, and observed by Eulenburg, Eichhorst, Wetherbee, and Ormerod, are given at the conclusion of the paper.

Streptococcus in Pneumonia after Typhoid Fever.

H. Neumann (*Berliner klinische Wochenschrift*, Nos. 26 and 27, 1886) reports a case of typhoid fever with noma and lobar pneumonia, followed by death. No typhoid bacilli could be found in the organs, probably because the disease was too far advanced. Very numerous cocci were, however, discovered in the pneumonic lung, which, upon cultivation, proved to be strep-

tococci. After making a large number of culture experiments and inoculations with the purpose of determining whether this species of streptococcus is identical with any of those described by Fränkel, Löffler, Krause, and others, Neumann comes to the conclusion that there exist no satisfactory and invariable points of difference between the various so-called species, either as regards their method of growth upon culture media, or in the symptoms they produce when inoculated upon animals. Even such supposedly distinct forms as the streptococcus of erysipelas, on the one side, and that of pus on the other, do not differ materially from the one found by him in the lung. The author believes that the various streptococci are really identical, but that they may in different cases possess different degrees of virulence when obtained from the organism, and that they may alter this degree upon cultivation.

In the case reported, it is most probable that the coccus was introduced directly into the lung by means of respiration—the ulcerative process in the mouth being the starting-point—and that a pneumonia was in this way produced in a subject already debilitated.

Diseases of the Heart Resulting from Over-exertion.

Leyden publishes an exhaustive article under this title in the *Zeitschrift für klinische Medicin*, Bd. xi. H. 2 and 3, 105–166. It has been recognized by many writers that diseases of the heart may be produced by muscular strain, as also by mental excitement or great emotion. The author quotes extensively from the literature of the subject, and speaks particularly of the "overstrain of the heart," as described by J. Seitz. Some distinguished authorities, however, claim that such a thing as the tiring or exhaustion of a heart, the muscular substance of which is perfectly healthy, cannot exist. Leyden has been convinced from an extensive experience, not only of its existence, but that it is very frequently a cause of many threatening cardiac symptoms.

Too often, as a result of our modern methods of physical examination, the pathological condition is called the disease, while no attention is paid to the manner in which it was produced. Thus, "dilatation of the heart" is denominated the primary affection, whereas it is but the effect. Following the rational method of studying them, Leyden forms three groups of diseases of the heart due to over-exertion of the body:

1. Sclerosis of the aorta, aneurism of the aorta, arterio-sclerosis.
2. Insufficiency and rupture of the aortic valves.
3. The true "cardiac overstrain" of Seitz, in which the valves remain quite intact, and the muscle substance is but little or not at all affected.

As regards the first two classes, Leyden says it is probable that severe labor is often a cause of arterio-sclerosis. It is certain that it frequently produces aneurism. And that insufficiency of the aortic valves is often suddenly effected by violent muscular exertion is proved by numerous cases in medical literature, from which he quotes several very interesting instances. But he devotes attention particularly to the third class, and reports a series of instructive cases, from which he draws the following conclusions:

The symptoms of "cardiac overstrain" develop either suddenly or more gradually in individuals who have put forth violent exertion throughout a longer or short time, or in those who have employed perhaps only moderate

bodily exercise, while convalescing from some slight disease (Da Costa). We can recognize two stages:

First stage: Cardiac erethism. The symptoms are at first scarcely noticeable. The patient becomes easily tired, suffers some shortness of breath on exertion, and perhaps some pain about the heart, with palpitation. Of objective symptoms, the first to be observed is:

(*a*) *A change in the character of the pulse*, which becomes more rapid, especially after exercise, and at the same time irregular. This combination (*delirium cordis*) is present either constantly or at times in nearly all cases.

(*b*) *An increased heart's impulse* is another symptom, sometimes associated with the "gallop rhythm" described by Fränkel. The origin and indication of this peculiar phenomenon are not fully understood. It certainly occurs only in weak conditions of the heart.

(*c*) When the affection is advancing, *tremor cordis* develops itself. This symptom, recognizable to the hand as a peculiar trembling, undulating impulse, is caused by a succession of very rapid incomplete contractions.

Second stage: Cardiac dilatation. The symptoms of this stage are:

(*a*) *Dilatation of the Heart.* This, when present, can be usually although not always detected. The position of the apex beat, when perceptible, is the best criterion for the existence of dilatation of the left ventricle.

(*b*) *Auscultatory Symptoms.* The heart tones are usually clear, and either strong or weak. Sometimes the "gallop rhythm" is to be heard. Occasionally a systolic murmur is audible at the apex, due probably to a relative insufficiency of the mitral valve.

(*c*) *Functional Disturbances connected with Weakness of the Heart.* These include the symptoms of the first stage intensified. They are: Increased dyspnœa amounting even to orthopnœa; a great sense of pressure; attacks of pain in the cardiac region resembling often angina pectoris; total incapability for bodily or mental labor; cerebral symptoms, as vertigo and fainting (these may also occur in the first stage); disturbances of digestion which constitute symptoms of grave prognostic import, and disturbances of circulation similar to those seen in valvular affections, and prominent among these œdema.

A *third* or *terminal stage* of the disease exists, characterized by extreme weakness of the heart muscle. Asystolia or cardiac insufficiency is developed, with its attending symptoms; as cyanosis, suppression of urine, collapse, etc., and finally coma, ending in death. This stage seldom lasts long. It may, indeed, be so short that we speak of "sudden death."

As to prognosis and termination, the disease is always a serious affection, yet it can usually be arrested during the first stage, and complete or partial recovery takes place. Sometimes, however, symptoms of the greatest danger to life arise before any perceptible dilatation is reached.

In the second stage the tendency of the disease is toward a fatal termination; either rapidly or after lasting for years. Temporary improvement may repeatedly take place, and the dilatation even be reduced in amount. Sometimes the disease appears to begin with the second stage. In other cases an individual after violent exertion suffers at once from the symptoms of the terminal stage of heart overstrain, and dies after a short time.

The autopsy of all of Leyden's fatal cases revealed dilatation of the heart, especially of the left ventricle, together with a globular widening of the apex.

The other organs showed the ordinary results of passive congestion. The heart muscle was sometimes thinner than normal, especially at the apex, and frequently exhibited tendinous patches. It was often microscopically quite intact, but not infrequently had undergone slight fatty or fibrinous degeneration in the layer just beneath the endothelium. Since this was never of a degree sufficient to account for the presence of dilatation by assuming that there had occurred earlier some myocarditis, Leyden believes the dilatation is due to a simple stretching of the previously healthy muscle, caused by the greatly increased arterial pressure following violent muscular action.

This over-exertion of the body may be the only acting cause, or it may be combined with others. Such, for example, are other diseases of the heart already existing, especially affections of the aortic valves. Leyden reports an interesting example of its combination with stenosis of the aortic orifice. Arterio-sclerosis, particularly as represented by contracted kidney, may also coöperate with bodily over-exertion to produce a dilated heart.

A series of other etiological influences, which of themselves are sufficient to produce cardiac weakness or cardiac erethism, will even more certainly secure results injurious to the heart, when combined with overstrain of the body. They are the abuse of alcoholic drinks; "fat-heart" (*i. e.*, the weak heart produced by corpulency); the previous occurrence of acute diseases; anæmia and chlorosis; advancing years, and finally mental agitation and excitement of the passions. These latter might be called "psychical overstrain," since they produce the two most prominent symptoms following corporeal strain, namely arrythmia and dilatation of the heart. We may also distinguish the two stages, that of cardiac erethism, and that of cardiac dilatation. Leyden has observed instances of serious injury to the heart arising from a combination of psychical and corporeal overstrain.

An unusual group of cases, instances of which the author relates, differ considerably from those already described. Over-exertion of mind or body is the cause, but the symptoms consist in attacks of fainting, general weakness, and a *very marked retardation of the pulse rate* to forty, thirty, or fewer beats per minute. This latter symptom is the most prominent one, and frequently persists after the others have disappeared.

The treatment must be directed against the cause. All over-exertion is to be avoided; and even absolute rest in bed is often necessary. The diet must be nourishing and stimulating, and it is of the highest importance that dyspepsia, if present, be removed. Of drugs, by far the most useful is digitalis. Its beneficial action is to be judged by its diminishing dyspnœa, producing diuresis, and strengthening the systole; not by its retarding the rapid pulse-rate. This is not always to be sought after, and its occurrence is an indication that the desired action of the drug upon the heart has been overstepped. Its employment is contraindicated in excessive cardiac weakness, and in very rapid or very slow pulse-rate. When administered, use rather large doses for one to three weeks, and then stop for a time, as it loses its effect. Helleborine, caffeine, strophanthine, and convallaria are similar to digitalis in their effect, but inferior to it.

Narcotics often cannot be dispensed with, in order to give rest for some hours to patients suffering great pain or oppression, but they must be used with care. Tonics are sometimes beneficial—extract of coca among others.

Cheerfulness is to be cultivated. Change of scene and air (but not to salt air) are useful.

Various "cures" have been recommended for chronic diseases of the heart. The milk cure, used by Russian physicians, is not favored by Leyden. Salt baths or iron baths, as recommended by Scholz, and others, may be beneficial. Massage and gymnastics of a suitable kind have been much praised, and would perhaps be of use if employed in proper cases. He is opposed to the "heart gymnastics" of Oertel, on the ground that they are either inefficient or injurious.

As a supplement to his paper, Leyden publishes a personal communication from Dieckerhoff, professor at the veterinary school in Berlin, regarding the diseases of the heart occurring in horses after over-exertion. There may be produced an enlargement *in toto*, hypertrophy with dilatation, and various lesions of the valves. They are most frequently observed in horses used for rapid travelling, since the greatest and most prolonged strain is experienced by them.

Contributions to the Diagnosis and Therapeutics of Diseases of the Stomach.

Riegel (*Zeitschrift für klinische Medicin*, Bd. xi., H. 2 and 3, 167–216) publishes the results of his experience during the year 1885, but devotes his long and exhaustive article solely to the bearing of the chemical examination of the secretion of the stomach upon the diagnosis and therapeutics of its diseases. This chemical examination he considers, in most cases, indispensable, and it is often the sole means of forming a correct diagnosis, particularly in carcinoma.

His method of procedure is as follows: He administers a "test meal" at dinner-time, consisting of a mixed diet, the same for every case, and in six or seven hours he removes this *undiluted* by means of a stomach-tube. Digestion should be complete within seven hours and the stomach empty, therefore any portions of undigested food thus removed prove that the process has been unnaturally delayed. He next filters the mass thus obtained, and tests the filtrate with reference to the following conditions: (1) The reaction as exhibited with litmus. (2) The presence of free hydrochloric acid and (3) of organic acids. The tests preferred are tropæolin oo 3, methyl-violet, and the carbolized chloride of iron test of Uffelmann. (4) The digestive strength ascertained by the artificial digestion of a portion of albumen of a definite size. (5) The amount of free hydrochloric acid present, estimated quantitatively. Sometimes he tests also for peptone and parapeptone. Simply the macroscopic examination of the material left upon the filter will, in some cases, render an almost certain diagnosis possible. Vomited matter cannot be used for purposes of diagnosis, for the act of vomiting generally occurs soon after a meal, and free hydrochloric acid does not normally appear until about three hours after eating. The admixture of mucus from the mouth and nose, or of regurgitated bile interferes, too, with the chemical tests.

Riegel's conclusions, based upon 1379 chemical examinations in 122 cases, are that in diseases of the stomach we may find four conditions of the secretion: (1) It is completely normal. (2) Free hydrochloric acid is diminished in amount or absent (*i. e.*, cannot be detected by the tests mentioned), organic

acids are usually abundant; peptic strength is wanting. (3) Hydrochloric acid is present, together with a large quantity of the organic acids. (4) There is a hypersecretion of hydrochloric acid. In general, whenever free hydrochloric acid is to be found there is no diminution of the digestive strength.

Considering now the bearing of these various conditions of the secretion upon the different diseases of the stomach, the author finds that in *carcinoma ventriculi* free hydrochloric acid is almost *constantly* absent and digestive power is entirely wanting. This is the strongest of all diagnostic signs, and without it a diagnosis of carcinoma cannot safely be made, even though other characteristic symptoms be present. During seven years he has seen no case in which the acid was generally or even frequently present. The cause for this absence of the acid is not yet fully explained. Riegel believes it to be due to some alteration produced in the gastric juices by the carcinoma.

In certain cases of *continuous discharge of bile into the stomach* he found no free acid or peptic strength. This is caused by the chemical action of the bile upon the gastric juice.

In *ulcus ventriculi* the removal of the contents of the stomach cannot be safely practised while the ulcer is still unhealed. In convalescents the peptic strength was normal; organic acids were usually absent, and the amount of free hydrochloric acid rather increased than otherwise.

In *gastrectasia* (not due to carcinoma) free hydrochloric acid was very rarely absent, and the digestive strength was not diminished. Certain cases showed the acid to be much increased in quantity, and at all times present in the stomach, thus interfering with the digestion of starchy food. Organic acids were often abundant.

In *chronic dyspepsia* the amount of free hydrochloric acid was sometimes diminished but oftener increased, and the peptic strength was usually normal. Lactic acid was generally present, and at a time when it should normally have disappeared.

Nervous dyspepsia is characterized by severe dyspeptic symptoms during digestion, yet without alteration of the secretion in any respect. It is a neurosis of secretion. Riegel treats of the therapeutics of gastric disorders only as indicated by the chemical examination.

Dilatation (apart from that caused by pyloric stenosis) is produced by retarded digestion, causing food to be continually present in the stomach. This retardation is effected: (1) by a diminution of the secretion; (2) by abnormal fermentation; (3) by hypersecretion; (4) by diminished muscular power. In all these conditions the washing out of the stomach must be practised daily, in order to remove all undigested food before fresh nutriment is given. But this should always be combined with other methods of treatment, as indicated by the chemical examination—such as the use of antacids, the avoidance of starchy foods in cases of hypersecretion, and the employment of massage and electricity when there is lack of motor tone. He prefers to wash out the stomach in the evening, and then to give a very light and easily digestible meal. The organ thus obtains a period of rest during the night.

In all cases of diminished secretion he advises the administration of hydrochloric acid in divided doses, beginning an hour after meals. Thus the presence of too great an amount of acid is avoided, and the digestion of starch not interfered with. Yet in carcinoma he has never found that hydrochloric acid,

when given alone, appeared in the gastric juice, or increased its ability to digest. He believes that large doses of the acid combined with pepsin might have a better effect. Peptones, too, are well borne by the stomach, and patients often improve for a time on them.

On the Treatment of Gastric Ulcer with the Albuminate of Iron.

Realizing that it is often necessary to remove the ultimate cause—the anæmia or chlorosis—before the healing of a gastric ulcer can be accomplished; and having had five years of most satisfactory experience with the albuminate of iron in other affections, GEMPT (*Berliner klinische Wochenschrift*, No. 15, 1886) was led to employ it in cases of gastric ulcer in which the ulcer was still unhealed.

The use of iron in this stage has been universally condemned on account of its irritant effect. But the liquor ferri albuminate made by Drees, of Bentheim, is of absolutely nentral reaction, free from any metallic or astringent taste, does not coagulate albumen, and is perfectly well borne by the stomach. Gempt administers two to four grammes of the solution, alone or diluted with milk, three times a day and shortly before meals, as it appears to increase the appetite. The recent occurrence of hæmatemesis is no contraindication to its use. His results have been surprisingly good. After the exhibition of the remedy was commenced, he has never seen hemorrhage recur, although he has used it in numerous cases. Nor has he ever seen its administration produce pain, or increase it if already existing. It seems to be absolutely unirritating to the walls of the stomach or the surface of the ulcer.

With the use of the albuminate he combines a careful diet of milk or beef peptones, the employment of small doses of Carlsbad salts, as recommended by v. Ziemssen, and of small doses of morphia when absolutely necessary. It is very important to procure a reliable preparation of the iron albuminate, since some are not totally free from acid.

On the Diagnosis and Therapy of Perforative Peritonitis.

E. WAGNER (*Deutsches Archiv für klinische Medicin*, B. 39, H. i. and ii. S. 70) reports an unusual instance of perforation of the intestine with peritonitis; and after discussing the various means of diagnosis proposed, draws the following conclusions:

The only infallible method of differentiating between intestinal meteorism and peritoneal meteorism, occurring respectively in acute peritonitis and in peritonitis from perforation, lies in the fact that in the former the coils of intestine are visible, or their movements may be felt, or, at any rate, heard on auscultation; while in the latter no movements can be detected by any of these methods. The auscultation must be continued at least two minutes.

This condition is produced by the presence of gas in the peritoneal cavity, which displaces the intestines backward and compresses them.

The only proper method of treatment consists in abdominal section for the removal of the contained fluid and gas.

Chyluria with Chylous Ascites.

Professor Senator records an interesting case of this not very common affection. The patient, æt. forty-six, a Prussian, had lived for a long time in North America, and resided most of the time on a marshy peninsula in Massachusetts. Of his antecedent disorders, it is stated that he had had a double sciatica, lumbago, and an illness that set in with fever and headache, in the course of which icterus developed, attended with a dark brown urine. It was not until considerably later that the milky urine made its appearance. On examination, Senator found an enlargement of the liver and spleen, without any further change. At the apex was heard a low murmur, with the first sound. The urine had the appearance of a yellowish emulsion; had a sp. gr. of 1.020, without any remarkable smell, with an acid reaction; there was a copious sediment of urates. The scum on the surface microscopically showed nothing more than fat globules. The supernatant fluid on being removed from the sediment, and shaken up with ether, cleared up considerably, but not entirely. This it did, however, on the addition of liquor potassæ. The urine contained, in addition to the fat globules, serum albumen, globulin, or fibrinogen and propepton. The chylous feature of the urine was most marked in that passed during the night or toward the morning; that excreted during the day was free from chyle. The chyluria continued for three weeks, then disappeared. Ascites developed, and the effusion of fluid was so great that tapping had to be performed. Nine litres of a greenish milky fluid were withdrawn, possessing a neutral reaction, and a sp. gr. of 1.015. The fluid cleared up on the addition of ether. Microscopic examination revealed extremely fine fat granules and a few lymphoid cells. The patient became extremely emaciated, and, after a time, succumbed.

An autopsy was refused. The diagnosis of hepatic cirrhosis, with chronic peritonitis, was made. Two different conditions may give rise to a milky appearance of ascitic fluid: (1) finely divided fat, mixed with real chyle (hydrops chylosus); (2) finely divided fat, mixed with fat globules (hydrops adiposus). The first may have for its causes: (1) injury of the chyle vessels, or rupture from over-disturbance, due to coarse mechanical obstruction; (2) the presence of parasites (filaria sanguinis) in the blood, causing stagnation and perforation of the chyle vessels.

Hydrops adiposus may be produced (1) by a fatty degeneration of the ascitic effusion, such as has been observed in carcinoma and tubercle of the peritoneum, and occasionally in simple degeneration of the peritoneal endothelium, without any other abnormality; (2) by an abnormal amount of fat in the blood—lipæmia. The remarks made about chylous ascites apply to chyluria. The differential points of the two forms, chyluria and adiposuria, are recognized with the microscope. In chyluria, excepting lymph cells, pus cells, and a few red blood-corpuscles, there will not be found any tissue elements, especially no tube casts or epithelium. In adiposuria, on the other hand, the urine will contain fat cells, various cylinders, and red blood-corpuscles. In that form of lipuria, however, due to lipæmia, all morphological elements will be wanting. It would seem as if the fat cells simply transude through the walls of the vessels without giving rise to any irritation.

Improvement in the use of Fehling's Solution.

As is well known, in performing the titration for sugar in urine with Fehling's solution, it is frequently difficult to determine exactly the moment of completed reaction. Generally, when this point has been reached, the precipitate falls at once as a more or less flocculent mass, leaving, in a few moments, a clear supernatant fluid the color of which there is no difficulty to determine. But it often happens, especially when the percentage of sugar is small, that in spite of precipitation there remains a permanent greenish-yellow turbidity, due to fine particles of cuprous oxide in suspension, and of a degree sufficient to hide completely the delicate shades of blue which the fluid assumes as the reaction nears completion. It is impossible to remove this turbidity by filtration, for the particles of suboxide are so fine that they will pass through any filter-paper. Nor is this turbidity the only difficulty, for the urine contains normally substances which not only reduce the cupric salt to a cuprous, but also redissolve the cuprous oxide when formed; among these are creatinin, uric acid, ammonia evolved from the nitrogenous substances by the NaHO of the Fehling's solution, and glycuronic acid compounds. Hence, when a considerable amount of sugar is present, it is customary to dilute the urine so as to minimize the reducing and dissolving influences as far as possible.

In order to obviate the difficulty which this persistent turbidity presents, I. Munk (*Virchow's Archiv*, 1886, vol. cv. p. 63), after experimenting in various directions, found that the addition of three to five drops of a fifteen per cent. solution of $CaCl_2$, when 10 c. c. of Fehling's solution had been used, was sufficient to carry down with it everything remaining in suspension, and to leave a fluid above, not only perfectly clear, but also containing no trace of copper in solution. When the calcium chloride is added there is formed, in addition to calcium hydroxide, calcium tartrate. The tartrate, though soluble when cold, forms a gelatinous precipitate at the boiling temperature, and it is this which carries all before it as it settles. Another, though minor advantage, is that it prevents the precipitation of earthy phosphates and carbonates which occurs when urine is added to the alkaline copper solution, it having the power of holding these precipitates in solution.

Munk finds this method to answer perfectly well for urines in which the proportion of sugar is even less than one per cent., and the amount of creatinin, etc., large, though a larger amount—fifteen drops—of the $CaCl_2$ solution will then be necessary. The solution should be added after the first precipitation by the sugar has taken place. As from the character of the precipitate ebullition is liable to be accompanied by sudden and violent liberations of steam, it is advisable to use a small flame and a fine-meshed gauze beneath the flask.

Quantitative Determination of the Reducing Substances in Normal Urine.

Certain constituents of normal urine, known collectively as "reducing substances," have the power of reducing cupric to cuprous oxide, while at the same time they hold the latter in complete or partial solution when once formed. Hence the turbid amber or yellowish or greenish-red color

often assumed by urine on boiling with alkaline copper solutions. This power of the reducing substances forms, necessarily, a small but nevertheless appreciable element of error in the quantitative determination of glucose by Fehling's method. FLÜCKIGER (*Zeitschr. f. Phys. Chem.*, vol. ix.), SALKOWSKI, (*Centralbl. f. d. med. Wissensch.*, 1886, No. 10), and I. MUNK (*Virchow's Archiv*, 1886, vol. cv.), have sought to determine the amount of these substances.

Flückiger adds, after the copper salt has been reduced, a ½ per cent. solution of glucose from a burette, till all the cuprous oxide in solution or suspension has been precipitated. From the amount necessary to produce complete precipitation the reducing power of the volume of urine used is calculated. He determined it to be equal to a solution containing 0.15 to 0.25 per cent. of glucose.

Salkowski's method is as follows: 5 c. c. of urine, 5 c. c. of sodium hydrate solution (sp. gr. 1.34), and 3 to 6 c. c. of a ten per cent. cupric sulphate solution are boiled together for five minutes. The mixture is then feebly acidified with hydrochloric acid, and the cuprous oxide which has been formed precipitated by potassium sulphocyanide; the precipitate is then dried and weighed. From this it was determined that the average reducing power of the urine was equal to that of a 0.4 per cent. glucose solution.

In repeating Flückiger's experiments, Munk met with the same difficulty mentioned in the preceding notice, namely, that the cuprous oxide remained in a state of fine suspension in many cases, even after the addition of what was afterward proved to be quite an excess of glucose. To overcome this difficulty he had recourse to the $CaCl_2$ solution described above, with excellent results, the entire precipitate being carried down, leaving a clear fluid above. In nine specimens of normal urine examined, he found the amount of reducing substances, calculated as glucose, to vary between 0.16 and 0.47 per cent., an average of 0.3 per cent.

ALBUMINOMETRY BY ESBACH'S METHOD.

ESBACH, of Paris, had tubes so graduated that when albumen was precipitated in them by a picric acid solution, and allowed to stand twenty-four hours, each degree covered by the sediment corresponded to so many grammes of albumen per litre of urine. His picric acid solution is made as follows: Picric acid 10 grammes, citric acid 20 grammes, water 1000 grammes. George Johnson, of London (*Lancet*, July 10, 1886), has recently tested the accuracy of this method with, as he states, gratifying results. He finds that a solution of picric acid, five grains to the ounce, gives results identical with those obtained by Esbach's solution, while it does not, like the latter, precipitate the urates and uric acid, which, when abundant, may prove a source of no inconsiderable error by increasing the bulk of the precipitate. VEALE, of London, and GUTTMANN, of Berlin, also testify to the accuracy of this method. The tubes may be had of Brewer Frères, 43 Rue St. André des Arts, Paris, and of E. Cetti, 36 Brooke Street, Holborn, London.

OXYBUTYRIC ACID IN DIABETIC URINE.

STADELMAN (*Zeitschr. f. Biol.*, xxi. p. 140) agrees with Külz and Minkowski in affirming that the acid found in the urine, in many cases of diabetes, is

oxybutyric acid. In accordance with his view that diabetic coma results from the presence of an acid in the blood, he proposes to treat these cases with intravenous injections of a three to five per cent. solution of sodium carbonate. He injected considerable quantities of a seven per cent. solution into the veins of a dog with no untoward results.

Conditions Affecting the Presence of the Volatile Fatty Acids in the Urine.

In normal urine VON JAKSCH (*Tagebl. d.* 58 *Vers. deutsch. Naturf. u. Aerzte*, Strassburg, 1885) found volatile fatty acids to exist preformed, in amounts varying from mere traces to 0.008 gramme a day. The variation in quantity is very considerable, and depends on the character of the food taken. Alcohol increases it. In the febrile condition relatively large quantities are found (from 0.06 to 0.1 gramme in twenty-four hours), the amount being proportional to the height of the fever. In pneumonia and phthisis the increase appears to depend chiefly on acetic and butyric acids, but in typhoid fever on acetic acid alone. In all organic hepatic disease (cirrhosis, abscess, chronic hepatitis, carcinoma, and syphilitic liver) the quantity often amounted to over 0.1 gramme a day. In a case of diabetes with acetonuria, no fatty acids were found. The term "lipaciduria" has been applied to this condition.

A New Hæmometer.

VON FLEISCHL (*Oesterr. med. Jahrb.*, 1885 and 1886) has constructed a new form of apparatus for measuring the quantity of coloring matter present in the blood, intended for rapid and accurate clinical use. He very correctly calls attention to the fact that the practice now in vogue of counting the corpuscles is of comparatively little value, since it is not their number but their richness in hæmoglobin which is of the more importance. The determination is made by comparing the color of a definitely diluted specimen of blood with that of an illuminated wedge of ruby colored glass, upon which are graduations showing the correspondence between the different tints of the glass, as conditioned by its thickness, and solutions of hæmoglobin of certain strengths. The apparatus is manufactured by Reichert, Bennogasse 26, Vienna.

SURGERY.

In Europe.

UNDER THE CHARGE OF

FREDERICK TREVES, F.R.C.S.,

SURGEON TO, AND LECTURER ON ANATOMY AT, THE LONDON HOSPITAL.

Recent Surgical Literature.

Since the appearance of the last summary, two new volumes of the *Dictionnaire Encyclopédique des Sciences Médicales* have been issued. The first runs from "Tep" to "Tet." The most important article comes under the

head of "Testicule," and to the discussion of the anatomy and affections of this organ over 150 pages are devoted. The anatomical sections are written by Wertheimer, Tourneux, and Hermann; the pathological sections by Mollière, Augagneur, and Reclus. The monograph maintains the high standard that has made this dictionary famous. Of special value and importance is the able paper on syphilitic affections of the testis by M. Reclus. The next article of surgical interest is "Tetanos," by Dr. Mathieu. It is an elaborate and valuable paper; a little verbose in its pathological sections, but exhaustive and up to date. In conjunction with it may be noted Dr. Raymond's shorter article on "Tetany."

The second volume covers the ground from "Ele" to "Embr." The principal surgical paper is that by Dr. Brassac, on "Elephantiasis." It provides an excellent summary of the chief features of this somewhat ambiguous affection, or series of affections, but in completeness and originality does not compare favorably with Esmarch and Kulenkampff's monograph recently noticed in this summary. The other article of surgical import is "Embolie," by Dr. Raymond.

Dr. Lorenz's monograph, entitled *Pathologie und Therapie der seitlichen Ruckgratverkrümmungen* (Vienna, 1886), will be received with pleasure by all orthopædic surgeons. It deals, as the title implies, with the whole subject of lateral curvature of the spine (scoliosis). Although the literature of this deformity is very extensive, and in fact too extensive, the present volume will be most welcome. So many theories have been advanced as to the causes of scoliosis, so many accounts have been published of its anatomy, and so many measures have been devised for its relief, that this all-comprehensive and well-digested book will be accepted with relief. It is admirably written, is founded upon careful original research, and is illustrated by an excellent series of cases. The sections on the anatomy of the affection are peculiarly interesting, and next in value may be placed the sections on treatment. The questions relating to diagnosis and prognosis are also well discussed. The book is illustrated by excellent plates of the bones concerned and by a series of photographs from patients.

Dr. Paul Bruns has issued (June, 1886) a new fasciculus of his *Beiträge zür klinischen Chirurgie*. It is mainly occupied with a long statistical examination of the cases of harelip occurring in the clinic between the years 1843 and 1885. The paper will have an historical value, and seems well to demonstrate the progress of treatment. The other principal papers are on actinomycosis in man, and on the treatment of cold abscesses. The treatment mainly concerned is that by iodoform injections.

Les Bactéries et leur Rôle dans l'Anat. et l'Hist. path. des Maladies infectieuses, by Cornil and Babes (Paris, 1886), is the second edition of a well-known work. It has grown greatly in bulk, and its alarming dimensions are a visible criticism upon the progress of bacteriology. It may be safely said that the present volume forms the most complete and valuable treatise upon bacteria that we possess. The subject should be well discussed in 838 pages. The first part deals with a description of all forms of microörganisms, their classi-

fication, varieties, and modes of growth. It contains an excellent chapter on "Ptomaines," and another of practical value upon the question of the "Attenuation of Virus."

The second part concerns the various diseases that are accredited with a bacterial origin. Under this heading a full account is given of Pasteur's work in connection with hydrophobia. The question of bacteria cultivation is very fully considered. The volume concludes with a capital index and a copious bibliography.

The book is illustrated with 348 figures and 4 lithographic plates. The latter are disappointing. A large number of the figures in the text are printed in colors after the manner of the illustrations in Dr. Woodhead's well-known work. It is to the credit of British book art to note that these illustrations fall far below the excellent drawings in the work just alluded to.

La Syphilis Héréditaire Tardive, by DR. FOURNIER (Paris, 1886), is an elaborate monograph forming a substantial addition to the literature of syphilis. It abounds in original matter, and is illustrated by valuable clinical material. It deals with hereditary syphilis as it appears in children, at puberty, and in adults. A chapter is also added upon acquired syphilis in young children.

Of osteoclasis we know little in England, and from DR. POUSSON'S point of view, as expressed in his brochure *De l'Ostéoclasie* (Paris, 1886), surgery suffers greatly from that ignorance. This operative measure has certainly developed vigorously upon French soil, and our chief knowledge of it comes from French surgeons. Dr. Pousson's book professes to give a complete account of the whole subject. It is perhaps needless to say that by osteoclasis is meant the forcible straightening of a bent bone, and that to effect a "*redressement*" a fracture is usually produced. It also includes the forcible fracturing of normal bones in certain cases of joint deformity. The author gives a full account of the various terrible looking instruments that are in use, and enters into the details of their working. He proceeds to point out the application of osteoclasis to certain diseased conditions, and supports his statements by a large series of clinical cases. He discusses the employment of the osteoclast in examples of vicious union after fracture, in rickety, curvature of long bones, in knock-knee, and in certain forms of ankylosis. The work, which appears to be very carefully written, concludes with a good bibliography, a very necessary appendix at the present rate of literary growth.

Nouveaux Éléments de Pathologie Externe, by PROF. BOUCHARD, is a new work on surgical pathology of which only the first fasciculus has been issued. The publishers engage to complete the work in four fasciculi at a cost that will not exceed twenty-four francs. It is an unpretentious volume, without any especial *raison d'être*. It has one conspicuous flaw—it lacks illustrations. Part I. deals with general subjects; with atrophy, hypertrophy, and the various degenerative processes. It then embraces inflammation and the healing process, and the whole subject of tumors. It concludes with an

account of the pathology of wounds. As a summary of the present state of pathological knowledge the book may be of value. The chapter on wounds is certainly excellent, and is written in a thorough and masterly manner. The sections on the complications of wounds and the effects of certain constitutional conditions upon wound healing are the best in the book, and contain much valuable material.

The following recent articles and publications, which cannot be noticed in detail, may be mentioned:

"Illustrations of Exceptional Symptoms and Examples of Rare Forms of Disease," by Jonathan Hutchinson, F.R.S. (*Brit. Med. Journal*, May and following months). This is a valuable series of interesting cases briefly reported.

"On the Affections of Joints which Complicate or Follow Scarlet Fever," by Dr. Henry Ashby (*Brit. Med. Journal*, 1886, vol. i. p. 971).

"Ligature of the Innominate Artery," by Bennett May (*Lancet*, 1886, vol. i. p. 1064). The patient, a man aged thirty-three, had an aneurism of the right subclavian. The innominate was ligatured. A ligature made up of six catgut threads was used. The spray and strict Listerian precautions were employed. The patient died of secondary hemorrhage on the nineteenth day.

"Pistol Wound of Abdomen; Complete Perforation of the Stomach; Recovery," by Dr. Clemon (*Lancet*, 1886, vol. i. p. 1109).

Manual of Pathological Histology, by Cornil and Ranvier, English edition, vol. ii. part ii. This volume completes this important standard work.

"Hereditary Deformity (Claw-foot and Claw-hand), Appearing in Five Successive Generations," by Dr. Fotherby (*Brit. Med. Journal*, 1886, vol. i. p. 975).

"Hereditary Deformity (Claw-foot and Claw-hand), Appearing in Four Successive Generations," by Mr. William Anderson (*Ibid.*, p. 1107).

"On the Treatment of Stone in the Bladder," by Mr. William Cadge (*Brit. Med. Journal*, June, 1886).

"The Treatment of Complicated Fractures of the Skull," by W. Wagner (*Sammlung klin. Vorträge*, Nos. 271, 272).

"On Neuropathic Joint Affections," by Prof. Czerny, of Heidelberg (*Bericht der deutschen Gesellschaft für Chirurgie XV. Congress*, p. 76). This article contains a full review of the subject, with much original matter. The *Transactions* of this Congress contain many papers of value and interest.

Fracture of the Patella.

An interesting review of the various methods of treatment of this injury is contributed by C. Brunner to the *Zeitschrift für Chir.*, Bd. xxiii. Hefte 1 and 2. In a very large number of cases treated with strapping, plaster-of-Paris cases, Malgaigne's hooks inserted into strips of gutta-percha, etc., the average stay in hospital was nine to ten weeks, the universal result firm fibrous union, and in two cases the fragments were again broken rather than the ligamentous band connecting them. One case of compound fracture in which antiseptic suture was employed resulted in bony union, another of primary resection died

of pyæmia. Puncture of the joint with a view to letting out the blood was tried in several cases without any ill effect, though in some it failed owing to coagulation. Ninety cases of suturing the fragments (of which half were done for old fracture) afforded no less than five deaths from pyæmia, three cases of amputation, nineteen of suppuration in the joint, fourteen of ankylosis, and many more of stiffness and greatly impaired movement. Passing a suture round the patella (through the quadriceps tendon and ligamentum patellæ) resulted in one death and two cases of suppuration out of a total of seven so treated. It is no wonder that the writer regards the old methods as being by far the most satisfactory, and the indications for operation by suture as very exceptional. We must own to an impression that the results of the new operations for fractured patella in England would be found to be less unfavorable than those at present recorded from Germany.

Mr. F. Treves, in the *British Medical Journal* of July 24, 1886, advocates the use of Malgaigne's hooks, applied in the original manner, under strict antiseptic precautions. The latter include the free use of iodoform and the exposure of the limb both night and day, so that the vitiated air under the bedclothes cannot have access to the part. Having carefully marked the position at which the hooks must enter, so as to grasp securely the fragments, he makes four punctures with a tenotomy knife, the upper two allowing the effusion to escape. No anæsthetic is required, the hooks are kept in position about six weeks, and the results hitherto have left nothing to be desired.

Compound Fracture of the Patella.

Mr. G. R. Turner (*Lancet*, 1886, vol. i. p. 809) has collected twenty recorded cases of this injury, and in addition to an excellent summary of the results of treatment he gives a case under his own care. It was that of a man aged thirty-three. The fracture was transverse and due to direct violence. The joint was washed out with carbolic lotion and dressed with full aseptic precautions. No rise of temperature followed and the wound remained aseptic; in six weeks a small sequestrum came away and rapid healing followed. The patient can flex the knee very nearly to a right angle. The fragments are separated by about three-quarters of an inch when the limb is extended, but the man has good use of the joint. The following is the summary of 20 cases collected from various sources:

Total cases, 20. All recovered; 12 with good movement, 5 with slight movement. In 3 ankylosis occurred (1 after excision of the joint).

Antiseptic treatment (without suture): 9 cases, 7 recovered with good movement; 1 with partial movement, and 1 with bony ankylosis.

Antiseptic suture: 5 cases, 2 recovered with good movement and 3 with partial movement.

Carbolic oil to wound; 2 cases, recovery with good movement.

Lint soaked in blood applied to wound: 1 case, good movement.

Removal of patellar fragments, suture of quadriceps to ligamentum patellæ: 1 case, slight movement.

Excision of knee: 1 case.

Antiseptic treatment for a time: 1 case, fibrous ankylosis of joint.

In connection with this paper may be mentioned a case of compound com-

minuted fracture of the patella reported by MR. BRAMWELL (*Lancet*, 1886, vol. ii. p. 1102). The parts healed without operation and excellent movement was preserved in the articulation.

ON THE EARLY TREATMENT OF PROSTATIC RETENTION OF URINE.

MR. BUCKSTON BROWNE has published a somewhat elaborate paper on this subject (*British Medical Journal*, 1886, vol. i. p. 809). He points out the seriousness of the question of repeated catheterism in elderly men, and discusses the fever that so very commonly follows the practice. This fever (usually called urethral or catheter fever) the author believes results from urethral shock communicated to the sensitive excretory apparatus of the kidney through the nervous system, and causing all degrees of suppression of urine from the merely momentary up to the most complete. The more sensitive and cultivated the nervous system of the patient the more readily does he suffer from this fever. The amount of fever is proportionate to the amount and character of the instrumentation, and this, when made under the influence of morphia, is often followed by no fever in cases where fever is sure to follow if no drug be employed.

When retention exists in cases of prostatic enlargement catheters must, of course, be passed. They should be soft and small. The best is a No. 5 or 6 (Eng.) vulcanized India-rubber catheter (Jacque's patent). If this fails, a French coudée or bicoudée catheter. If still unsuccessful, the surgeon may try a very soft-ended olivary catheter or a large coudée instrument (No. 12 Eng.), or an ordinary gum-elastic catheter that has been stiffened by the stylet. The early treatment of prostatic retention by catheter is conveniently considered under three heads. 1. In cases where the prostate has only recently enlarged, and where the partial but habitual retention of urine does not amount to more than two or three ounces after every natural act of micturition; with proper care recovery should always take place. These patients become accustomed to the catheter and use it daily. 2. Cases where the patient is able to void urine, but is obliged to do so with much frequency, and there is a large area of hypogastric dulness on percussion, often do not come under notice until there is complete retention. They are always grave and sometimes almost hopeless. Morphia should be given before catheterism, and the whole of the urine not drawn off the first time. 3. There is a form of complete retention which may be termed the paroxysmal complete prostatic retention, in which the patient only occasionally requires catheterism, often going for long periods without the slightest need of the catheter.

Cocaine as a lessener of urethral shock during early catheterism is impracticable.

HYPERTROPHY OF THE PROSTATE.

According to SIR HENRY THOMPSON (*British Medical Journal*, 1886, vol. i. p. 1156), a healthy prostate is made up (1) of pale muscular fibres, connective tissue, and the yellow elastic fibres—stroma; (2) of simple gland cavities and their ducts. In addition to these elements a quantity of secretion, more or less abundant, is always present; besides which certain bodies, known as "prostatic concretions" are always met with.

The prostatic enlargement of advancing years may be classified as follows:

A. Over-development of tissues, glandular and stromal, mostly in normal relations throughout—"true hypertrophy."	An uncommon form. Degree of enlargement not considerable.	Secretion abundant, Concretions numerous.
B. Increase of stroma, chiefly of connective tissue, and not of muscle—"fibrous hyperplasia." If the muscle element is developed in like proportion—"fibro-muscular hyperplasia."	The most common form. Attains the largest size.	Secretion varies with amount of gland tissue present. A few concretions.
C. Excess of gland tissue over stroma—"glandular hyperplasia."	Rare.	Secretion and concretions abundant.
D. Rearrangement of the normal structures, fibrous and glandular, in the form of tumor.	Common.	

Hernia into the Foramen of Winslow.

An example of this very rare condition is furnished by Mr. Square (*Brit. Med. Journ.*, 1886, vol. i. p. 1163). The patient was a man, aged twenty-five. He was seized suddenly with symptoms of acute obstruction—collapse, pain, colic, and vomiting. No operation was performed. The vomiting became feculent, and the patient died after an illness of three days and seventeen hours. The autopsy revealed slight peritonitis. Eight inches of the ileum at a spot about two feet from the cæcum were firmly incarcerated in the foramen of Winslow. The foramen admitted two fingers. The cæcum was very movable, and attached by a meso-cæcum.

Trephining for Intracranial Abscess.

Mr. Hulke (*Lancet*, 1886, vol. ii. p. 3) deals with that form of abscess which occurs in connection with suppuration in the ear. These abscesses are frequent, and nearly always fatal. There is much difficulty in diagnosis. The clinicist cannot yet with certainty distinguish between meningitis, thrombosis of the cerebral sinuses, and abscess in the cerebrum or cerebellum. The author, without entering into the question of differential diagnosis, observes that two symptoms especially characteristic of otitic intracranial abscess are an abnormally slow pulse and a low temperature. Three cases are given. 1. Male, aged forty-five. Chronic otorrhœa, caries of the petrosal; intense earache and headache, attended by vomiting, and later by unconsciousness and loss of control over sphincters; abscess erroneously supposed to be in the temporo-sphenoidal lobe; that lobe was punctured after trephining. Death next day. Abscess discovered in cerebellum. 2. Female, aged nineteen. Chronic otorrhœa; polypus; trephining; abscess in the temporo-sphenoidal lobe. Death on the seventh day. 3. Female, aged fifty-five. Chronic otorrhœa; intense earache and headache, followed by cerebral symptoms, and finally by coma. Trephining through the occipital bone, and the evacuation of an abscess of the cerebellum. Death on the following day. Mr. Hulke concludes with these words: "We must strive at perfecting the early diagnosis of abscess, and this once made, we must boldly, and without hesitation, apply the same general principles of surgery which govern the treatment of abscess in any less noble part of the body."

Rest in the Treatment of Scrofulous Neck.

Mr. Treves (*Lancet*, 1886, vol. i. p. 1060) urges the systematic employment of rest in all inflammatory affections of the neck, claiming for the neck the same privileges in this direction that other parts of the body enjoy. It is needless to point out that scrofulous gland swellings in the neck, together with scrofulous abscesses and the sinuses that result therefrom, are as a rule very chronic in their course, and very obstinate in their relation to treatment. There is little in the anatomy of the neck to account for this. The neck, however, is a part of the body that is in almost constant movement, and if rest is of real import in the treatment of inflamed tissues, then there can be few parts of the body where it is more clearly demanded than in this place. If in the axilla or groin there be a glandular swelling, or a chronic abscess, or a lingering sinus, the first injunction to the patient is an injunction "to rest." The author employs rest as a routine measure in all inflammatory conditions and after all operations upon the part. The neck is fixed by means of a light felt splint that takes its hold from the shoulders and the occiput. This splint has been worn continuously for months. It is used in cases of scrofulous disease both before and after suppuration has appeared, and as an adjunct to the various operations performed for this disease. Very distinct benefit is claimed for this simple addition to treatment.

Antiseptics.

The immense stride which iodoform and corrosive sublimate have made in general favor is emphasized by various contributions to the recent literature of antiseptic treatment.

Dr. Kümmell, of Hamburg, having employed perchloride of mercury solutions (in varying proportions from 1 : 1000 to 1 : 10,000) in upward of a thousand operations, speaks of it in the most favorable terms.

In one case of amputation of the breast he met with toxic symptoms of a mild nature, and in two abdominal operations the antiseptic produced very grave phenomena, ending in one case fatally. He records them in the *Centralblatt für Chirurgie*, of May 29, 1886. The first was a woman aged thirty, from whom he excised a large uterine fibroma, using during the operation a solution of 1 : 5000 of perchloride. Sanguineous diarrhœa, spongy gums, increasing prostration, and a normal temperature formed the chief evidence of toxic effects. The patient died on the fourth day, and at the autopsy recent ulceration of the ascending colon was the only lesion observed. In the second case (double ovariotomy on a patient aged twenty-five) the same symptoms rapidly supervened, and the collapse was so severe that venous injection of a saline solution was resorted to with the most happy result. The diarrhœa and mercurial stomatitis gradually subsided and the patient made a good recovery. Kümmel advises that in abdominal operations on anæmic patients or on those with some renal complication, another antiseptic than the sublimate should be used, or sterilized water alone employed.

A good deal of discussion as to the best antiseptic material for the battle-field has lately been held in Germany, and Dr. von Lesser (*Centralbl.*, July 3, 1886) points out the great merits of iodoform wool and powder, which were largely used in the latest European war, that between Servia and

Bulgaria. The lightness, distinguishing odor and color, stability, and comparative harmlessness of iodoform are all points in its favor, apart from its undoubted value as an antiseptic.

Von Mosetig-Moorhof (*Wiener med. Wochenschrift*, 1886, No. 16) conducted the treatment of over eight hundred gunshot wounds and compound fractures in the late campaign, and whilst using iodoform throughout, observed no toxic symptoms resulting threfrom. The statistics given appear very favorable (tetanus being one of the chief causes of the mortality), but the uncertain value of mere numbers as a test will excuse further comment upon them. In the German Military Hospital at Belgrade Dr. Fränkel (*Wiener med. Wochenschrift*, 1886, Nos. 11–14) was able, by the aid of antiseptics (iodoform, corrosive sublimate, and carbolic acid), to carry out conservative treatment with most brilliant results. Out of one hundred and fourteen gunshot fractures (many involving the larger joints) not one required amputation, and the writer strongly urges in all such injuries antisepsis with partial resection, if required, in preference to major operations.

A new antiseptic (iodol) is commended by Schmidt (*Berlin. klin. Woch.*, 1886, No. 4) as being equal to iodoform and free from the latter's disagreeable odor.

The Antiseptic Treatment of Erysipelas.

Dr. Haberkorn contributes in the *Centralblatt für Chirurgie*, May 8, 1886, a short but emphatic recommendation of benzoate of soda as an internal remedy for erysipelas. He treated fifty cases with this drug, giving 300 grains daily, and asserts that in nearly every one the temperature fell and the local symptoms improved within about twenty-four hours from the commencement of the treatment. No local measures were employed. The method recommended has certainly advantages in respect to the patient's comfort over carbolic acid injections, scarification, etc.

Intestinal Obstruction Due to Gall-stones.

As an appendix to the account of a fatal case of large gall-stone impacted in the ilium, Wising reviews the record of fifty cases (*Nord. med. Ark.*, Bd. xviii. No. 18). He points out with regard to diagnosis the great preponderance of female patients (three out of every four cases), their advanced age (usually over fifty), and the frequent previous occurrence of jaundice, biliary colic, and localized peritonitis. The symptoms, however, of the stone passing into the small intestine (especially the duodenum) may be very slight. When the stone becomes impacted the early onset of vomiting, the absence of distention in the colon, and detection of the mass under an anæsthetic, aided perhaps by exploration with a needle, may lead to a certain diagnosis. The mortality of obstruction due to gall-stones is probably at least eighty per cent., and even if the obstacle finds its way into the colon the damage done to the intestinal wall may have given rise to subsequently fatal ulceration or stricture. In three cases massage or palpation was successful in dislodging the stone, whilst all of the four in which laparotomy was done proved fatal. The free use of enemata and opiates is advised, and the author dissuades from early resort to operative measures.

On Fractures and Dislocations.

Prof. Bruns (*Tübingen klinik.*, Bd. ii. Hft. 1. p. 1) has collected the records of thirty-five cases of embolism of the right heart or lungs, thirty of them ending fatally. Fractures of the leg produced the lesion in twenty-four cases, of the thigh in seven, the humerus in three, and the patella in one case. The transfer of the embolus was probably brought about in several examples by movement of the limb, and in one case the accident happened no less than ten weeks after the fracture.

F. Müller (*Ibid.*, p. 19), from a large number of statistics, concludes that after simple fractures a rise of temperature, lasting a few days, occurs in eighty-five per cent. of the cases. The age of the patient, the amount of extravasation, etc., could not be traced to have any effect upon the slight amount of fever.

Treatment of Complicated Fractures of the Long Bones.

Bircher (*Bericht des deutschen Chirurgen-Kongress*, April, 1886) has employed ivory rods and clamps in compound fractures and cases of pseudo-arthrosis, under strict antiseptic precautions. If the fracture is through the diaphysis he inserts the peg into the medullary canal of either fragment, if through cancellous tissue he chisels a groove for one limb of the clamp to lie in. Of five cases reported the result was very favorable. The ivory is removed at the end of some weeks. The violence done to the bone in the latter proceeding as well as in the insertion of the peg, etc., will probably render the cases in which this treatment is adopted very limited in number.

Hausmann (*Ibid.*) advocates for similar cases the use of screws which are passed through a metal (nickelled steel) strip in which a row of holes has previously been made, and which is laid upon the fractured bone. The screws, which have long handles for the purpose of removal, are driven into the fragments, one on either side of the line of fracture. In twenty cases of complicated fracture in which this method was adopted at Hamburg, a good result was obtained, the apparatus being removed at the end of one or two months.

Dislocation of the Radius with Fracture of its Head.

W. Wagner (*Ibid.*, p. 93) has observed two cases of dislocation of the radius outward, in which there was good reason to believe that the inner border of its head had been broken off by forcible impact against the capitellum. The patients were young adults, and the lesion was produced by a violent impact against the elbow, the forearm being flexed and pronated at the time. Great limitation of movement and bony thickening of the radial head followed, and led to its successful excision in each case. Löbker, of Greifswald, alludes to the complication of the outward dislocation, and states that in two cases he has known the small splinter of bone form a "joint-mouse."

Resection of a Cancerous Œsophagus.

Mikulicz (*Prager med. Wochenschrift*, 1886, No. 10) succeeded in resecting the upper end of the œsophagus for carcinoma in a woman aged fifty. After

preliminary tracheotomy and the usual incision for œsophagostomy, the lower end of the canal was secured to the skin wound. Four months later obliteration of the fistula was obtained by a further operation, and it was not until two months more had elapsed that a recurrence of the growth was noticed, and this proved fatal about a year after the first operation. It is interesting to note that the patient's mother died of cancer of the stomach.

Laryngectomy for Malignant Disease.

Dr. David Newman (*Lancet*, July 24, 1886) records a most successful case of excision of the larynx for an epitheliomatous ulcer extensively involving that organ. The patient was a man aged thirty-seven, and after an artificial phonatary apparatus had been supplied he was able to talk well and to return to his occupation as a confectioner. Six months after the operation there was no sign of a recurrence. Preliminary tracheotomy, the insertion of a large tube plugging the trachea and preventing the descent of blood into the air-passages, division of the canal at its lower part first and subsequent section of the upper thyroid cornua and epiglottis after the thyroid cartilage had been bared, and the slight amount of hemorrhage were the chief features of the case. An œsophageal tube was introduced through the wound and kept there for some days, the patient being ultimately able to swallow solid as well as liquid food without difficulty.

Toxic Symptoms from Cocaine.

G. Bockl (*Deutsche Monatsschr. für Zahnheilkunde*, February, 1886) observed once out of some one hundred and forty cases of tooth extraction under cocaine alarming symptoms follow its use. He had injected six drops of a twenty per cent. solution into the gums and removed the tooth without pain. Ten minuter later the patient's gaze became fixed, and there was temporary visual defect, with slight delirium. Inhalation of nitrite of amyl quickly put an end to these symptoms, nor were there any bad after-effects. In a similar case reported by Schilling, of Nürnberg, in which the nervous symptoms were more marked, the effect of amyl nitrite was equally decisive.

On the Results of Operation for Cancer of the Lip.

Amongst the valuable monographs lately derived from Professor Bruns's clinic at Tübingen is one by A. Wörner, dealing with 300 cases of cancer of the lip, of which 277 underwent operation. About ten per cent. were in women, five per cent. affected the upper lip, and in one case both upper and lower were involved. The mortality after operation, chiefly from hypostatic pneumonia, amounted to six per cent. Nearly sixty per cent. of the cases had no recurrence at intervals of from five to eight years; of the remainder, the disease returned, in the great majority, within a year. Wörner appends further statistics of other German operators, and these give a much less favorable view of the operation.

Removal of Sebaceous Cysts.

Dr. C. Lauenstein (*Centralblatt für Chirurgie*, June 26, 1886) advocates making the incision away from the highest part of the cyst, and hence that

at which the skin is most adherent; then, with the knife handle, separating the cyst wall from the surrounding tissues. After prolonging the cut over the centre, he removes the tumor in the usual way, claiming that by this method there is little risk of rupturing the sac at its thinnest portion.

The Treatment of Malignant New Growths with Arsenic.

F. Köbel (*Mittheilungen aus der Klinik. zu Tübingen*) gives some materials for forming an opinion as to the value of the free use of arsenic in cases of malignant tumors, especially lymphoma or lympho-sarcoma. In a case of the latter, a man aged thirty-six, who had multiple growths in one axilla, over the clavicle, close to the spine, etc., subcutaneous local injection of arsenical solutions, together with its administration by the mouth, resulted in suppuration and ultimate disappearance of the tumors. Two subsequent tumors were treated in the same way, and for three years the patient has remained free from any recurrence. Against this one successful case must be placed seven in which the treatment had no result; nor did it once succeed in cases of epithelioma, etc. Collecting from other writers the records of over fifty cases of lymphoma treated with arsenic, we find in a considerable proportion diminution of the tumor, but hardly any of what could be called, even by the most sanguine, a cure.

Spitzer and Hermann (*Wiener med. Blätter*, 1886, No. 8), after treating several cases of epithelioma and lupus with the application of lactic acid, conclude that it is a very painful and slow method, and that it in no way selects the diseased tissues from the sound ones.

Extirpation of Tumors of the Groin.

M. Kirmisson treats this subject in the *Revue de Chirurgie*, May 10, 1886. The chief question of interest relates to the dangerous proximity of those tumors extending beneath the fascia lata to the femoral vessels, and it is argued that if necessary it is quite legitimate to denude either vein or artery. If this is done, however, the danger of strong antiseptic solutions (such as those of chloride of zinc) causing ulceration of the vessel-walls should be borne in mind. Should the vein be accidentally wounded two courses are open—to ligature it above and below, or to add to this proceeding ligature of the artery. Experience shows conclusively that the latter is not to be recommended, as it favors the occurrence of gangrene. If the peritoneum be wounded, as has occurred occasionally, it should be sutured.

The author comments on the great liability of these operations to be followed by erysipelas, and to the danger of suppuration causing secondary hemorrhage, and concludes an interesting paper by an appendix of cases and a good bibliography.

Cyst of the Pancreas.

F. Salzer (*Zeitschrift für Heilkunde*, Bd. vii.) narrates a case of this rare disease, occurring in a woman aged thirty-two, in which the large fluctuating tumor was diagnosticated as an ovarian cyst and its removal attempted. During the operation a large adherent artery which had been supposed to run in the abdominal wall, required ligature with its companion vein, and they

proved to be the splenic vessels. Much difficulty was experienced in removing the cyst, and the patient died on the sixth day of suppurative peritonitis. It is interesting to note that no changes were found at the autopsy in the spleen, this fact being attributed to the previous establishment of collateral circulation through its capsule. The formation of the cyst was first noticed during convalescence from "typhus fever." *Cf.* the recent work of N. Senn on the subject of cysts of the pancreas.

Epithelioma of the Breast.

Prof. Czerny reported to the Congress of German Surgeons (April, 1886) a case of "plexiform carcinoma of the rete Malpighi" originating in the skin of the left breast of a woman aged fifty-three. The supra-clavicular glands were affected, and were excised together with the breast. Six months later a small recurrence near the scar required a further operation. Czerny points out the distinguishing features of this case from those of "Paget's disease of the nipple."

Osteochondro-sarcoma of Breast.

An example of this very rare mammary tumor has been published by Mr. Battle (*Lancet*, 1886, vol. i. p. 975). The patient was a widow, aged seventy-three, and had had five children. The tumor began as a small lump on the inner side of the nipple six years ago. It remained stationary and of the size of a pea for two years. During the ensuing three years it increased to the size of a hazelnut, and then grew more rapidly. When admitted into St. Thomas's Hospital the tumor was the size of an orange, painless, and of hard consistence. The skin over it was movable, except at the inner part, where it was adherent and red and tense. The nipple was much retracted. A small, freely movable gland was detected in the axilla. The breast was amputated and the patient did well. The tumor on examination appeared to be composed of two parts. The larger part was soft, friable, and very vascular; the smaller segment was very hard and resembled bone. Microscopically the softer parts were composed of round and spindle cells, the harder, of cartilage which in places had ossified, with the development of Haversian systems.

Abscess in the Antrum of Highmore.

Mikulicz (*Bericht des Kongress*, p. 23) advocates perforation of the antral wall from the inferior nasal sinus, using for this purpose a special instrument. He has employed this method with success once, and has repeatedly proved its practicability on the dead subject. He argues that the usually adopted sites for perforation of the antrum are inconvenient and the aperture difficult to maintain open, and that his method possesses distinct advantages in these respects.

Ziem (*Monatsschrift für Ohrenheilkunde*, 1886, No. 2) holds that many cases of persistent ozæna and nasal blenorrhœa are kept up by disease of the mucous membrane lining the antrum. The symptoms of this complication are very vague, and in no less than twenty-nine cases out of a total of thirty-seven in which he perforated the anterior wall he found pus in the cavity. Its frequent irrigation led in eight of these to a complete cure and in thirteen to improvement.

Tetanus.

The belief that this disease is due to a blood infection, possibly of microbic nature, is steadily gaining ground. Several observers (Carle, Rattone, and others) have succeeded in inoculating dogs with tetanus and in transferring the disease from one animal to another. Nicolaier, during researches on the microbes in earth, noticed tetanic symptoms develop in several of the animals experimented on; and Socin, of Basle, has lately confirmed this. Rosenbach (*Gesellschaft für Chirurgie, Kongress*, April, 1886) produced fatal tetanus in mice and dogs by the subcutaneous injection of matter taken from the wound which had caused the disease in a man, the experiments being conducted an hour after the death of the latter. The incubation period was usually thirty-six hours, and the symptoms commenced near the part injected, spreading later to the whole body. The identity of the "tetanus bacilli" with those of the so-called "earth tetanus" was demonstrated in Professor Koch's laboratory on April 10th. They are described as being of bristle-shape, and they have been observed in the spinal cord and sciatic nerve of tetanic animals.

In America.

Supravaginal Amputation of the Uterus for Uterine Fibroids.

In a paper read before the New York Surgical Society (*Medical News*, June 12, 1886), Dr. F. Lange reports seven cases of uterine fibroids. In three of these he performed amputation of the uterus, in one he removed the tumors only, and in three recovery ensued after sloughing of the tumors. The cases in which he removed the uterus all recovered. In that in which the tumors only were extirpated, death ensued on the third day from peritonitis apparently caused by infection from a necrotic tumor.

Dr. Lange has preferred amputation of the uterus, in all his cases, to removal of the ovaries. He advocates a free abdominal incision, considering that it does not increase the danger of the operation, while hemorrhage is more quickly checked, and the use of undue force avoided. To secure the stump he employs the elastic ligature passed beneath the peritoneum. He thus explains his method of using it: "Imagine both broad ligaments being tied, there exists, on either side of the uterus, close to the edge, an opening through which the most median ligature of the broad ligament has been passed. Between these two openings the elastic ligature is passed, underneath the peritoneal covering, first on the anterior then on the posterior side of the uterus, and tied at the point of introduction." The ends of the ligature he secures with silk. Having amputated the uterus about three centimetres above the ligature, he excises the tissues of the stump in the form of a funnel, which he closes with deep catgut sutures. Thus is obtained a source of blood supply for the stump which is left within the peritoneal cavity.

The cases in which sloughing of the tumor occurred required surgical interference to remove the necrotic masses through the vagina, or by incisions and

scraping, with thorough irrigation. In one of these the tumor filled nearly the entire abdomen, in another it reached nearly to the umbilicus. Ergot was used in all the cases, hypodermatically and by the stomach; but in only one did it appear to bear any causal relation to the death of the tumor. In one case sloughing of the tumor seemed to be caused by violence done to it in an attempt on the part of the patient to save herself from falling. Only two of the patients were near the menopause. For irrigation of the uterine cavity a solution of corrosive sublimate, 1 to 2000, and the borosalicylic solution, prepared according to Thiersch's formula, were used. In addition to the discharge of portions of tumor from the interior of the uterus, in one case an abscess formed posteriorly, and was opened through the vagina; and in another an abscess presented anteriorly in the retroperitoneal space below the umbilicus, and was opened through the anterior abdominal wall. The course of these cases was protracted over several months, but ultimately recovery was complete.

Alexander's Operation.

Dr. William M. Polk published, in the *Medical Record* for July 3, 1886, a paper read before the New York Academy of Medicine, reporting fifteen cases of the operation for shortening the round ligaments of the uterus. The indications for the operation he states as follows:

"Prolapse of the uterus; retroversions and retroflexions of the uterus, in which the organ can be placed in the normal position, and yet a pessary cannot be comfortably worn; prolapse of the ovary, the organ being reducible, and not large enough or diseased enough to demand removal."

He performed the operation in two cases where the uterus was bound down by adhesions, and in both the result was unsatisfactory, the uterus returning to the position it occupied before the operation. In one case he was able to maintain in a position of anteversion a uterus which had been held down by a fibroid tumor on its posterior aspect. Pregnancy occurred subsequent to the operation in one case, and, at the time of the report, had gone on to the sixth month without unusual symptoms except a dragging pain along the round ligaments. In none of the cases had unpleasant bladder symptoms followed the operation. In three cases of prolapse of the uterus, in one of which that organ lay entirely without the vulva, the results were so satisfactory as to lead Dr. Polk to advise shortening of the round ligaments before attempting repair of the perineum, and he infers that, as compared with perineorrhaphy alone, this operation is preferable.

In the paper he gives a full description of the operation. To hold the uterus in position during the operation he employs a sound with as large a bulbous extremity as can be passed to the fundus, and the organ is supported for a time afterward by cotton tampons. He does not consider it necessary to use a pessary after the operation. By actual experiment he proves that the round ligament will bear, without breaking, a weight of from four to five pounds, and that it does not stretch until a weight of two or three pounds is attached.

Laparotomy for Suppurative Peritonitis.

Dr. R. J. Hall read a paper before the New York Clinical Society, reporting a case of suppurative peritonitis due to ulceration and perforation of the

vermiform appendix, in which he performed laparotomy, resecting the appendix and draining the peritoneal cavity (*New York Medical Journal*, June 13, 1886).

The patient, already suffering from phthisis, had had a right oblique inguinal hernia since childhood. He had had symptoms of intestinal obstruction for two weeks before he came under observation, and for three days the hernia had been irreducible, and had become swollen, red, intensely painful, and tender. The whole abdomen was painful, but not distended. When operated upon, he was almost in a condition of collapse. The incision for hernia was made, and a sac opened which contained the vermiform appendix in a state of chronic inflammation lying in a quantity of fetid pus. The cæcum and attached portion of the ileum were found near the internal ring, bound together by recent adhesions and bathed in pus. There was a perforation of the appendix near its base. The appendix was ligated and removed; the original incision was enlarged upward, and the hand and forearm introduced into the peritoneal cavity to break down adhesions and remove pus. The cavity was cleansed with sponges wrung out in borosalicylic solution, and a long drainage tube inserted among the intestines. In spite of the unpromising condition of the patient, he made a good and speedy recovery.

Dr. Hall places much stress on the free drainage of the peritoneal cavity in such a case, and states that for irrigation he would prefer simply warm water.

Intubation of the Larynx.

Dr. Joseph O'Dwyer reports, in the *Medical Record* of June 5, 1886, a case of chronic stenosis of the larynx treated with his method of intubation.

The patient, a woman forty years of age, had contracted syphilis twelve years before she came under his observation. For two years the voice had been husky, and she had suffered from dyspnœa and stridor on slight exertion, with at times "severe suffocative attacks." The glottis was narrowed by cicatricial contraction, the result of ulceration, and by a band on the left side which nearly closed the opening. There was also, probably, subglottic stricture. Tracheotomy had been already advised.

The tube was first introduced on December 5th and was worn for fifty-six hours, the patient experiencing much relief. From this time until December 23d a tube was worn at intervals, and an examination of the larynx on January 3d, no tube having been worn for eleven days, showed that the cicatricial membrane had almost entirely disappeared. The dyspnœa had been entirely relieved. After a period of six weeks, there being some return of the trouble, the tubes were again introduced at intervals. At the date of the report the patient was wearing the tube during one night only in every two weeks and the period of intermission was being lengthened. Four tubes, of different sizes, were used upon this case, the largest measuring at the neck one-half inch in the antero-posterior diameter and one-fourth inch in the transverse diameter.

The results obtained certainly compare favorably with other methods of dilating the glottis, both in the time required and in the result attained.

In the report of the proceedings of the Chicago Medical Society, published in the *Journal of the American Medical Association*, July 17, 1886, statistics of eighty-three cases of intubation of the larynx for pseudo-membranous laryn-

gitis are given by DR. FRANK E. WAXHAM. There were among these twenty-three recoveries. The ages ranged from nine months to eleven years. Thirty-nine cases with eleven recoveries were under three years of age. Twenty cases are reported as actually moribund when intubation was performed, and all were such as to be hopeless without surgical interference.

ON FATTY AND SARCOMATOUS TUMORS OF THE KNEE-JOINT.

In a paper read before the Practitioners' Society, DR. ROBERT F. WEIR reports three cases of operation for movable tumors of the knee-joint (*Medical Record*, June 26, 1886).

In the first case, the tumor being a lipoma, there was a history of repeated effusion into the joint with some tenderness. The tumor presented near the ligamentum patellæ. and was movable to a limited extent. In removing it an attempt was made to take away as much of the pedicle as possible and the joint was considerably manipulated. Although strict antiseptic precautions were observed and drainage established, suppurative synovitis set in, a peri-arthritic abscess formed, and finally amputation had to be performed in the middle of the thigh. The unfortunate termination was attributed to the attempt to remove too much of the mass, and in subsequent cases only the tumor proper was removed, the pedicle being left.

The second and third cases reported were similar to the first in clinical features. In both the unpleasant symptoms were confined to occasional attacks of pain in the joint with, in one, fixation at times. In both the tumor was easily removed; the incisions were left open, and both did well under antiseptic dressings.

The largest of the three tumors measured one inch and a half in length, one inch in breadth, and nearly three-fourths of an inch in thickness. Two of the tumors proved, on microscopic examination, to be sarcomatous.

Dr. Weir has been unable to find on record but one other case of movable sarcoma of the knee-joint, although he refers to eight cases of lipomatous tumors.

OPHTHALMOLOGY.

UNDER THE CHARGE OF
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EXPERIMENTAL INVESTIGATIONS OF INTRAOCULAR TENSION.

HÖLTZKE (*Bericht der 17ten Versammlung der Ophth. Ges.*, 1885) has gone over the ground of experimental investigations as to the effects of certain alkaloids upon intraocular tension, and states the following facts:

Physostigmin and pilocarpine, in solutions of the ordinary strength, dropped into the conjunctival cul-de-sac, increase the pressure in the anterior cham-

ber, though pilocarpine does this to a much lower degree than physostigmin; but through the active contraction of the pupil caused by both of them a marked lowering of the general intraocular tension is produced.

Atropine lowers the tension in the anterior chamber, but by means of the mydriasis which it produces, a distinct increase of the general intraocular tension is produced.

Höltzke thinks that when, in the human eye accommodated for the near point, no difference is detected between the tension in the vitreous and the tension in the anterior chamber, it may be explained by the fact that by a purely mechanical muscular action the tension in the vitreous during accommodation is increased; this over-tension is immediately equalized by an advance of the lens. As a result of his investigations, he formulates the law that the intraocular tension under normal conditions is always dependent upon the blood-pressure.

Capsulectomy and a New Capsulectotome.

Telnikin (*Annales d'Ocul.*, Jan.–Feb. 1886) has devised a new instrument for tearing through false membranes by punching without any traction, by cutting in the field of the pupil an opening two millimetres wide, and drawing out the resected portion with the instrument; the vitreous humor being retained in place during the operation by the blade of the instrument. The capsulectotome is introduced closed through the wound of the original extraction, until the point has reached the field of the pupil, and it is then pushed behind the false membrane. Pressure on the pedal or stop is then withdrawn, which causes an obturator to project through a window in the blade, making with the latter a sort of duck's bill slightly open. If the blade of the lance is then pushed forward, the false membrane falls into the grasp of the bill, which is then closed by pressure on the pedal or stop, thus closing and cutting out the piece of false membrane. The instrument is then withdrawn.

The Physiological and Pathological Action of Cocaine.

Pflüger was incited to write this paper by observing some unfavorable results following the use of cocaine (*Kl. Monatsbl. f. Augenheilk.*, May, 1886). He describes two different kinds of corneal opacities, due to cocaine, viz., 1. That form of opacity which starts from the edge of the wound and extends into the corneal tissue, and disappears in from one to two weeks without causing any damage. This is probably dependent upon a deposit or precipitate formed by the union of the cocaine with the lymph. 2. That form of opacity which is accompanied by a long-continuing hypotonus and anæsthesia of the cornea, and sometimes by an obstinate vesicular formation on the cornea. In order to determine the mode of action of cocaine Pflüger propounds two questions: 1st. Is the anæsthesia of the cornea due to direct action of the drug upon the terminal filaments of the trigeminus, or is it caused by a lowered nutrition of these nerves in consequence of a narrowing of the vessels and obstruction to the lymph circulation in the cornea? 2d. Is the dilatation of the pupil due to paralysis of the sphincter in consequence of ischæmia of the muscular tissue, or to irritation of the sympathetic fibres which innervate the dilator muscle? All his own observations and ex-

periments lead him to espouse Zeglinski's conclusions that cocaine dilates the pupil not by paralyzing the sphincter but by irritating the dilator muscle of the iris, and is entirely independent of any contractile action exerted on the bloodvessels. Cocaine produces no effect on the iris of pigeons' eyes, which is exactly like that of mammals. One of the proofs that cocaine dilates the iris by irritating the sympathetic nerves of the iris is that it increases the mydriasis produced by atropine.

A Remarkable Case of Exophthalmos.

Motais reports a very remarkable case of exophthalmos occurring in a woman aged forty-three (*Annales d'Oculis.*, Jan.–Feb. 1886). The patient, after a slight illness of two or three weeks, was suddenly attacked by fever, violent cephalalgia in the right temporo-frontal region, and finally coma, which lasted twenty-four hours. When she regained consciousness there was such a degree of exophthalmos of the *right* eye that the organ was completely luxated outside of the lids, while the head symptoms had entirely disappeared. Three weeks later optic neuritis occurred in the *left* eye without any other symptom, but three weeks after this, or forty-four days after the occurrence of the exophthalmos on the right side, she was attacked by fever, left cephalalgia, coma, and exophthalmos of the *left* eye. All cerebral symptoms subsided, and slowly but steadily the double exophthalmos disappeared. At no time was there any symptom of arterial or arterio-venous aneurism. As a cause of the phenomena, Motais suggests thrombosis of the ophthalmic vein and cavernous sinus.

An Experimental Contribution to the Doctrine of Glaucomatous Excavation.

Laker (*Kl. Monatsbl. f. Augenheilk.*, May, 1886) propounds two questions which have an intimate bearing on this subject: 1. Has an increase in the intraocular pressure above the normal the power to produce a so-called pressure excavation in the optic nerve of a healthy eye? 2. Does the experiment upon the eye itself favor the assumption that the diminution of an abnormally increased intraocular pressure may possibly lead to a deepening of an already existing excavation, or even produce it? Laker's experiments were very carefully carried out, and led him to the following conclusions: The eyes which were submitted to an increased intraocular pressure, showed a distinct and very considerable curved or arched or concave yielding of the lamina cribrosa, beginning exactly at the scleral ring. From this he concludes that an abnormally increased intraocular tension acting for a certain period upon the unchanged eye of a cadaver produces the same changes as are found in a glaucomatous excavation.

Modified Sclerotomy in Cases of Corneal Staphyloma with Persistent Prolapse of the Iris.

In cases of this character Inonye (*Rev. Gén. d'Ophthal.*, March 31, 1886) recommends sclerotomy with subsequent reopening of the wound. He uses a narrow Gräfe knife, and makes his puncture in the cornea one millimetre from the corneal margin, and as far removed as possible from healthy cornea,

and the counter-puncture in the sclerotic one millimetre from the corneal margin. The incision should be six or seven millimetres long, and should cut the corneal margin at an angle of about twenty degrees. A compressive bandage is then applied. Twelve hours later this is removed and the wound reopened. This reopening of the wound is repeated a number of times, and then the pressure bandage is reapplied and left undisturbed for a number of days. When a firm cicatrix has been formed, an iridectomy may then be done if deemed desirable.

Injections and Dressings of Eserine and Ocular Antisepsis.

Wecker (*Annales d'Oculistique*, March–April, 1886) is a strong advocate of the use of eserine in ophthalmic surgery, even to injecting it within the anterior chamber. He considers that the quantity of liquid that may be injected after the extraction of a cataract depends essentially upon the state of tension of the eye. For the purposes of injection he makes use of a small aspirator, in which the pressure or suction is exerted by the finger upon a thin rubber membrane or drum-head stretched across the top of the glass bulb of the aspirator. He makes use of a solution containing 0.25 per cent. of salicylate of eserine. In preparing for an extraction, he first carefully disinfects the lids, and especially the ciliary margins, with a solution of mercuric bichloride (40 centigrammes to the litre), and then injects a stream of the same solution over the cornea and into the conjunctival culs-de-sac. He then makes the usual corneal incision, and by means of the "pince-cystitome" he removes a piece of the anterior capsule without injuring the iris. At the same time he dislocates the lens and removes it through the wound, and then carefully cleanses the wound. Previous to this, the speculum or elevators are removed, and the lids are held apart by the fingers of an assistant. He then introduces the canula of his aspirator into the wound, and injects into the anterior chamber as much of the eserine solution as may be necessary to cleanse it of all blood-clots and fragments of lenticular cortex. When the pupils are clear and black, he disinfects the wound by a stream of mercuric bichloride solution as before, and also the culs-de-sac and lids. The eserine prevents all danger of prolapse of the iris.

Diagnosis of Simulated Unilateral Amblyopia.

Chauvel (*Recueil d'Ophthalmologie*, April, 1886) has devised a modification of Flêes's apparatus for the detection of simulated unilateral amblyopia. The rectangular box is, by a hinged cover, absolutely divided into two equal parts, and kept in place by hooks. It is easily opened, and the interior parts may be changed at will. It is 33 centimetres long and 20 centimetres wide. The posterior wall or bottom of the box is formed by a plate of glass on which are fastened two printed cards, with the dimensions according to Perrin's scale, and separated by an interval of 0.01 of a metre. Illuminated by transmitted light, like the test-plates of all optometers, the characters are distinguished with extreme precision. The anterior wall of the box is furnished with two eye-pieces, separated by the usual distance, projecting somewhat more than a centimetre, to leave room for the nose of the patient between them. When the patient applies the eyes to the oculars, the observer placed at the

side may readily see that the two eyes are open, and remain so during the entire examination. A grooved spring in front of each ocular admits of the insertion of a lens when necessary or advisable.

The mechanism of transposition employed is that of André and Bertelé. A plate of thin wood pierced with two lateral holes gives the direct vision; a plate pierced by a single median hole gives the crossed vision of the test-cards. To facilitate the dissociation of the images, these openings are provided with weak prisms. It is impossible for the patient to know whether the test-cards are seen directly or not; the letters are always read in the natural sense. The two wooden plates are fixed perpendicularly one above the other, by one of their margins, and movable around this point of union which serves for axis. It is only necessary to raise or lower with the finger a metallic lever placed on the right side of the box and invisible to the patient, in order to produce the direct or crossed vision of the test-cards. When this lever is raised horizontally the vision of the test-cards is crossed. If the lever is lowered, if it is vertical, the vision of the test-cards is direct.

On Latency in Cerebral Tumor—A Case of Relapsing Neuritis.

Anderson's report of a case of relapsing neuritis (*Ophthal. Rev.*, May, 1886) is interesting. It occurred in a girl, aged seventeen, and illustrates the fact that optic neuritis arising from intracranial disease may run, not only its early but its entire course, without obvious affection of vision. Two interesting points arise in the consideration of this case: first, whether the neuritis arising from intracranial tumor necessarily ends in atrophy with more or less visual defect; and, second, whether a transitory, recovering neuritis must be explained, not by the presence of the tumor, but by a meningitis arising independently of a tumor. The patient, when she first came under observation, presented the usual symptoms of an intracranial growth. She recovered under treatment, and remained apparently in perfect health for more than a year; then, without any evident cause, she fell ill exactly as she had done before. She again recovered, and remains still apparently in perfect health; but Anderson believes she is not, and expects further developments in the case. Where the optic nerve has recovered from a neuritis, there is no reason why it should not again become inflamed; and, on the other hand, optic nerves which have undergone simple, non-inflammatory atrophy, may develop well-marked neuritis. In all cases of intracranial disease, it is wise to examine the fundus of the eyes frequently from the beginning to the end.

The Excision of the Retrotarsal Folds and other Procedures for the Cure of Trachoma.

Hotz (*Arch. of Ophthal.*, xv. 2) does not think that the operation of excision of the retrotarsal folds deserves a place in ophthalmic surgery, for he considers the cure worse than the disease. The retrotarsal folds are inserted between the eyelids and eyeballs, to insure to these organs perfect freedom of motion. Whenever the retrotarsal fold is destroyed, whether by accident or operation, its absence is manifested by a greater or less degree of ptosis, induced by this limitation of motion. Hotz also thinks that the great disposi-

tion to recurrent inflammations of the cornea and conjunctiva, observed in eyes where the retrotarsal folds have been obliterated, is a direct consequence of the continuous traction and tension to which the conjunctiva is subjected during the movements of lids or eyeballs.

In place of this operation, he recommends that the diseased follicles be squeezed and their contents evacuated as follows: The upper eyelid is held everted by the thumb or forefinger of the left hand, while the end of the thumb or forefinger of the right hand is inserted under the everted lid, with the palmar side toward the eyeball. Thus the upper tarsal border and the swollen or infiltrated retrotarsal fold are placed just between the two thumbs or forefingers. If now these thumbs or fingers are pushed toward each other, and at the same time if the thumb or finger of the right hand is made to glide slowly forward from under the trachomatous conjunctival fold, this is subjected to a steady and continuous pressure which will force out the contents of the trachoma follicles. By repeating this manipulation several times along the whole breadth of the eyelid, all the trachoma follicles may be evacuated at one sitting.

On the lower eyelid he uses an old-fashioned iris forceps, with a slight curve and no teeth; with its convex side upon the conjunctiva, the forceps is opened to engage a portion of the trachomatous fold. If now its branches close upon the conjunctiva, and the forceps are gradually moved upward, the enclosed conjunctiva is slowly run through the branches of the forceps and thoroughly squeezed. This squeezing process is very painful, even under cocaine, and an anæsthetic is sometimes necessary. The evacuation of the trachoma follicles is always attended by considerable bleeding. Short applications of cold water always alleviate the pain, and in two or three days the conjunctiva will have recovered from the effects of the squeezing process, and may be then treated with the remedies necessary to complete the cure.

Irritable Stricture of the Urethra in the Male, Resulting from Masturbation, a Cause of Hyperæsthesia of the Retina.

Beaver (*Arch. of Ophthal.*, xv. 2) reports a singular case of this nature. There was disturbance of only a single function of a single extension of the nerve centres—hyperæsthesia of the retina. The impressions which masturbation made upon the visual disorder must have passed harmlessly through the spinal nerve centres to the reflex centres at the base of the brain. Here a corresponding irritation was set up and reflected to the optic centre. The symptoms were first pain, then loss of sight, and a few minutes later faintness, which did not end in full syncope. The amblyopia was not dependent apparently upon disturbance of the inhibitory centres of the heart, which it preceded, but was the immediate effect of the irritation of the hyperæsthetic urethra.

Contribution to the Knowledge of Xanthopsia.

Thilbert (*Arch. of Ophthal.*, xv. 2) reports a case of xanthopsia occurring in a man, of medium size and strongly built, who was subject to epileptic seizures once in six or eight weeks. About twenty-four hours before every attack all objects appear of an intensely yellow color, which condition con-

tinues up to the beginning of the epileptic attack and then passes off. The disturbance of the color sense did not seem to correspond with the "aura," but appeared to be due to separate irritation of the color sense. The true "aura" was experienced just before the fit in the form of an acoustic conception. He usually cried out, "Do you hear the music?" and immediately became insensible. The patient's vision and field were normal, and his refraction was slightly hypermetropic. The fundus always appeared normal before, during, and after the attack. The disturbance of the color sense in this case was evidently central.

THE OCCURRENCE OF MICROÖRGANISMS IN THE CONJUNCTIVAL SAC IN PHLYCTENULAR CONJUNCTIVITIS AND OTHER CONDITIONS OF THE CONJUNCTIVA AND CORNEA.

GIFFORD'S paper is an interesting contribution to our knowledge of bacteriology (*Arch. of Ophthal.*, XV. 2). While assistant to the Ophthalmic Clinic at Zürich in 1885, he began making cultures from the conjunctival sac and from the skin pustules about the eyes in cases of phlyctenular conjunctivitis. In every case pathogenic cocci were found. All the primary cultures were made on the usual beef-extract peptone agar-agar. This was used in the usual test-tubes, which, after being inoculated, were kept at a temperature of 35°–37° C., at which the cocci grew rapidly at first, but they generally ceased growing in the course of forty-eight hours, unless transferred to fresh tubes.

Gifford found the following species of micrococci in the conjunctival sac: 1. A coccus growing in the primary cultures in milk-white glistening spots; on gelatine it also remains white; pathogenic. 2. At first white, then becoming orange-yellow on both agar and gelatine; in mass sticky and elastic; pathogenic. 3. On agar, showing only the slightest tinge of yellow; on gelatine, showing the same orange-yellow as in the preceding form; pathogenic. 4. A coccus growing on agar in tenacious masses with a slight tinge of salmon-yellow; on gelatine this color is more strongly marked; not pathogenic. 5. Bright lemon-yellow, growing abundantly on both agar and gelatine; pathogenic. 6. Very large; very many diplo- and quadro-cocci, also many specimens of the biscuit form; light salmon-yellow; not pathogenic. 7. Milk-white; occurring both individually and in short chains.

All the cocci obtained from the conjunctival sac occur chiefly as diplococci, but also singly and as quadrococci, and in short chains of three or four members. Noteworthy in all the cultures was the almost entire absence of bacteric forms other than micrococci. A coccus is pathogenic when, on inoculation into a cornea, it causes a severe keratitis with marked iritis and exudation into the anterior chamber. The process extends for two or three days, then becomes limited, and in the course of a month leaves merely a dense opacity behind. Introduced into the vitreous the pathogenic cocci produce a severe inflammation, which converts the greater part of the vitreous into a mass of cheesy pus, and may produce panophthalmitis. The non-pathogenic cocci, on the contrary, produce in the cornea only a small infiltration, and the iris is practically not involved. In the vitreous they cause a slight inflammation which soon becomes self-limited, leaving the greater part entirely clear. All this, of course, *proves* nothing as regards the etiology of conjunctivitis phlyctenulosa. It makes it somewhat probable, however,

that the first three species of cocci mentioned above bear some causal relation to the disease.

Gifford cites a number of cases to show the unreliability of washing out the conjunctival sac with sublimate solutions of 1 : 5000. In nearly all his cases the inoculations were made after the eyes had been bandaged antiseptically for one or more days. The solutions of mercuric bichloride, as ordinarily used, are by no means efficacious in disinfecting the normal conjunctiva, either because of the difficulty of reaching all the corners of the sac or from its property of causing albuminous precipitates, by which the solution is weakened and the fungi perhaps directly protected.

It seems strange to some, inasmuch as pathogenic microörganisms occur in many if not all normal eyes, that more operated eyes are not destroyed, and the reason probably is that infection of an incised wound is by no means so constant an accident as has been believed. The conditions in incised wounds of the cornea are not favorable for the occurrence of an infection, since the edges of the opening either cohere at once or are kept clean by the continually escaping aqueous. But the situation is quite different when, in any way, a colony of cocci is carried deeply into the anterior chamber or vitreous. The better results which have positively been obtained in ophthalmic surgery by the use of antiseptics are undoubtedly due partly to the cleaner hands and instruments used, and partly to the cleansing of the surface of the eyeball, which, while not preventing cocci from remaining in the depths of the conjunctival sac, tend to prevent them from being rubbed into the wound surface or carried into the anterior chamber with the knife or forceps. Finally, these results show that in testing the antiseptics to be used in ophthalmic surgery, we must try them on the fungi as they exist in the conjunctival sac.

Subconjunctival Lipoma in Connection with Ichthyosis Hystrix.

Bögel's cases (*Archiv f. Ophthal.*, xxxii. 1) are interesting. Both showed the same anatomical structure, of a dermal character, especially next the epithelium and the cutaneous connective tissue layers, in which are numerous well-marked nerve trunks and vessels, with an abundant fatty and glandular development. Bögel thinks that the existence of pure lipomata of the conjunctiva is doubtful, and he describes the subconjunctival lipomata as teratoid tumors, divided into two classes: 1st. Those which appear under the usual form of dermoid growths with all their attributes; 2d. Those in which are seen, besides the epithelium and cutaneous connective tissue, only hyperplastic deposits of fat, nerves, and acino-tubular glands. All these tumors of the conjunctiva are congenital. These teratoid conjunctival tumors, occurring at the external canthus, are to be arranged in the same category with those which occur along the margin of the cornea, which are always pure dermoids.

The Extraction of Intraocular Cysticerci.

Leber here reports fourteen additional cases of intraocular cysticercus removed by operation (*Archiv f. Ophthal.*, xxxii. 1). He describes his method of operating as follows: The conjunctival flap, made for the purpose of covering the scleral wound, is so made that the conjunctival wound may lie as far as possible from the wound in the sclera. The sclera is then opened either

with a narrow knife or with an oblique lance knife, and the wound is sometimes lengthened by the scissors. Strict antiseptic precautions are observed throughout the entire operation. The wound in the sclera is not closed, but the conjunctival wound is carefully closed with fine silk sutures. The place chosen for the operation depends, of course, upon the location of the cysticercus bladder.

The Therapeutic Value of Laceration of the External Nasal Nerve.

Lagrange (*Archives d'Ophthal.*, May–June, 1886) draws the following conclusions from his somewhat prolonged studies upon the effects of Badal's operation: 1. In neuralgia of the ophthalmic branch of the nerve of Willis, laceration of the nasal nerve gives results as good as those following laceration of the frontal nerve. 2. In acute glaucoma, the laceration of the nasal nerve almost always lowers the tension, causes a cessation of the pain, and often cures the case. In chronic glaucoma its effects are uncertain, and the definite results generally unsatisfactory. 3. In acute ciliary pain (as in traumatic irido-cyclitis, etc.) the laceration of the nasal nerve is an excellent operation, and sometimes does away with the necessity of an enucleation. In chronic ciliary neuralgia its results, though less certain, are sufficiently encouraging to induce its performance in all cases.

Studies on the Extraction of Cataract.

Bettremieux formulates the results of his studies on the methods of extraction of cataract (*Archives d'Ophthal.*, May–June, 1886) in the following conclusions: 1. The only classic method for the operation of senile cataract, applicable to the majority of cases, is the simple method of Daviel. 2. The extraction combined with iridectomy answers a certain number of special indications. 3. In the present state of ophthalmic surgery, iridectomy is indicated, 1st, a certain time before the extraction, as preparatory, in cases of cataracts which mature very slowly, and for certain complicated cataracts; 2d, immediately before the extraction, when the iris resists the exit of the nucleus (primary iridectomy); 3d, immediately after the extraction, whenever the iris has been bruised or has prolapsed; 4th, a certain time after the extraction, when the iris has become imprisoned in the wound.

OTOLOGY.

UNDER THE CHARGE OF

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Acute and Chronic Purulent Inflammations of the Middle Ear Tract and their Complications.

Dr. Samuel Sexton, of New York, at the recent meeting of the American Otological Society, July 20, 1886, read a paper with the above title. It was based

on the records of over two thousand cases, which were divisible into three classes, viz., acute purulent inflammation of the middle ear, acute catarrhal inflammation of the middle ear, and chronic purulent inflammation. Of this series, one hundred and thirty-one were grave, and twelve died. In no disease is a knowledge of regional anatomy more important than in that of the middle ear. Brain symptoms, such as headache, vertigo, pain, delirium, nausea, and vomiting may occur in consequence of middle ear disease, without lesion of the cerebral structure. The prognosis of purulent inflammation of the middle ear is favorable when suitable treatment is adopted, both as regards hearing and life. Out of twenty thousand cases of ear disease in the writer's practice, where the patient had been seen at the beginning of the attack, no fatal case had occurred. In regard to treatment, so far as drainage is concerned, incision of the drum-head is preferable. Trephining the mastoid has been recommended by some authorities, but Dr. Sexton maintains that the indications which have been regarded as calling for the operation with the mastoid trephine are insufficient. From his experience, he is led to believe that drainage can be best maintained through the natural channel.

A New Operation for the Radical Cure of Chronic Purulent Inflammation of the Middle Ear Tract.

Since describing a form of chronic purulent inflammation of the attic, at the meeting of the American Otological Society in 1885, Dr. Sexton has resorted to an operation with success in such cases, and in other cases of chronic purulent disease of the middle ear. It is found that in the greater number of these cases the remaining portion of the conducting mechanism no longer serves to aid in the transmission of sound, but acts rather as an obstruction to drainage. The author has observed that in a number of instances in which the transmitting mechanism had been lost a spontaneous cure followed, and it occurred to him that the curative action of nature might be imitated with advantage. When drainage from the attic and antrum is interrupted, a cure can only be assured by an operation permanently clearing the passage outward from the tympanum.

The operation about to be described was tried last year in a case of long-standing otorrhœa, due to chronic purulent inflammation of the attic. Since then the operation has been fully performed in several cases. The first step of the procedure is to separate the membrana flaccida from the edge of the auditory plate, and to remove any portion of the membrana vibrans adherent to the auditory ring. If the malleus and incus remain *in sitû*, it is well to divide the tendon of the tensor tympani muscle when present, where it leaves the handle just behind the short process and below the chorda tympani.

The chorda tympani, when remaining, is then divided where it enters the tympanum at the pyramid, and also at its exit into the canal of Huguier. The long process of the malleus, being also received into the glenoid fissure by means of this short oblique canal, along with the chorda, may be more or less detached at the same time. The detached tissues and ossicles should now be removed with the forceps. It will frequently be found that the incus, though displaced, still remains. It may be removed with the attic scraper, which is to be introduced from below and passed up along the inner wall of the tympanum, when the distal end may be carried over the incus or malleus,

if the latter bone remains, and by traction the ossicles can be detached. Polypoid masses, granulation tissue, and the products of inflammation may now be removed with the cutting curette or cutting forceps, and the parts dressed with a four per cent. solution of cocaine. There is usually free bleeding during the operation, often sufficient to protract it and increase its difficulties. In order to avoid the danger of using an ordinary lamp in connection with the administration of ether, an electric light has been used.

The effect of injury or destruction of the membrana tympani nearly always manifests itself in some way, but has never been a matter of serious import in Dr. Sexton's experience. The sense of taste may be temporarily affected, but finally becomes normal. The drum cavity should be kept well cleaned, and light dressings of boric acid applied until healing takes place. Salicylic acid powder may be applied as freely as it can be borne. In some cases irritation at first, is succeeded by a tolerance. It may then be kept up until the parts cease to discharge. In the cure resulting from this treatment, a dermic transformation of the tympanum takes place; but mucus may at times gain admission from the Eustachian tube. Where the incudo-stapedial connection remains, the operation may still be performed, unless a considerable portion of the membrana vibrans is present.

Suppuration of the Tympanic Cavity Treated with Instillations of Corrosive Sublimate Solutions.

Dr. Dujardin, of Havre, has been induced to try solutions of bichloride of mercury, on account of their well-known antiseptic power in suppuration of the middle ear (*Revue Mensuelle de Laryngologie, d'otologie*, etc., June, 1886). The first trial of this agent was made in a case of suppuration of the middle ear in a tuberculous patient. The result was very favorable, and he has employed this antiseptic in all cases of otorrhœa he has since observed, four in all. Having observed that in some cases the injections or instillations through the external auditory canal were inefficacious, the author resorted to injections of the sublimate solutions, through the Eustachian tube, after the method of Gellé (1885). This method is best adapted to cases with small perforations in the membrana tympani. With large perforations, instillations by the auditory canal will reach the drum cavity. Dr. Dujardin is not an aurist, and his experience in a procedure of rather doubtful expediency or necessity is based on only four cases. Otorrhœa can be cured in other ways, and therefore it is not required of the aurist to subject his patient to the risk of sublimate poisoning, on the purely theoretic grounds assumed by the author under consideration.

Trephining for Evacuation of Intracranial Abscess Occurring in Connection with Suppurations in the Ear.

Mr. J. W. Hulke reports (*Lancet*, July 3, 1886) three cases of intracranial abscess, from aural disease, in which trephining was practised. The first case was of chronic otorrhœa with caries of the petrous bone, and abscess in the cerebellum, erroneously supposed to be in the temporo-sphenoidal bone, and in which the lobe was punctured. The patient was a man, aged forty-five, who complained of severe pain in the left half of his head, most intense in the occi-

put, radiating over the temporal and frontal regions. Immediately above the pinna of the left ear there was a spot extremely tender on pressure, which proved a misleading symptom in the choice of the point for trephining. There was also tenderness on pressure behind and above the mastoid. There was history of chronic otorrhœa on both sides since childhood. About three weeks previous to his admission to the hospital, he began to have severe aching in the left ear, and a few days thereafter pain in the back of his head. He was unable to sleep, and the discharge from the ear was tinged with blood. He grew rapidly worse and became unconscious to external impressions. He swallowed with difficulty, and had lost control of his sphincters. Intracranial abscess was diagnosticated, and in the absence of other localizing symptoms the extreme tenderness above the pinna was taken as an indication that the abscess was probably above the level of the attachment of the tentorium in the middle fossa. The squamous bone was therefore perforated with a small trephine, the pin of which was set at a distance of one centimetre above the external auditory meatus. The dura mater was divided, and a blunt-ended director was passed through the opening toward the tegmen tympani, until it struck the upper surface of the petrous bone. No pus escaped. It was evident that the operation had failed of its purpose. Death occurred in about twenty-four hours after the operation.

The post-mortem revealed, in the left cerebellar hemisphere, about the centre of its anterior border, where this is in contact with the petrous part of the temporal bone, an abscess the size of a walnut, containing thick, greenish pus. This was in contact with a small aperture in the dura mater, through which pus had burrowed from a carious portion of the temporal bone in connection with disease of the internal ear. The left cerebellar hemisphere was considerably swollen, and had evidently compressed the pons and medulla.

Mr. Hulke then remarks, very justly, that "the post-mortem inspection left no doubt in my mind that this abscess could have been tapped by trephining the occipital bone, below the level of the attachment of the tentorium." He regrets that this was not done immediately upon the failure of the puncture of the temporo-sphenoidal lobe. Whilst the operation failed to accomplish the purpose for which it was undertaken, it is valuable as tending to show the relatively slight dangers attending it.

The second case was one of chronic otorrhœa, polypus in the auditory canal, carious perforation of the tegmen tympani, and abscess in the temporo-sphenoidal lobe. The patient was a girl, nineteen years old. She complained of headache, most intense at the vertex and in the right side of her head. Her right ear was absolutely deaf. The orifice of the meatus externus was full of fetid pus, on removing which a polypus became apparent. At the bottom of the meatus bare bone was felt with a probe. There was great tenderness over the mastoid, and, in a less degree, over other parts of the right side of the head. The temperature in the right axilla was 98°; in the left, 97.8°. Pulse 50, small, and slightly irregular. Her left ear was also deaf, and had once been the seat of chronic otorrhœa. Four weeks before coming to the hospital she had fallen, striking her head against a table, but not cutting the scalp. She appeared dazed and stupid for a day or two after. During the subsequent three weeks she had complained on and off of headache, and she had occasionally vomited. A week before her admission the headache

became more intense and the vomiting more frequent. It was decided that an intracranial abscess existed, and trephining was determined upon.

The extreme tenderness of the mastoid, and the fact that pent-up pus in this cavity sometimes gives rise to symptoms closely resembling those of intracranial abscess, suggested the propriety of first exploring this process. This was done, but no pus was found. Two days later, her condition becoming graver, and influenced by the history, and by the recollection of the position of the abscess in the preceding case, it was decided to explore for abscess in the cerebellum. The spot chosen for perforating the bone was about two centimetres behind and inward from the mastoid process, the crown of the trephine encroaching on the inferior curved line. This spot was chosen as being sufficiently beneath the lowest level of the horizontal part of the lateral sinus, and also sufficiently removed inward from the descending part of the sinus. The dependent position of the spot was also thought advantageous for drainage of the abscess, if found. The extremely thin bone in this case was easily perforated with a gouge. A grooved blunt director was passed through the opening in the direction of the internal auditory canal, until it touched the posterior surface of the petrous bone, and no pus escaping, the director was passed twice again, in directions approximately parallel to the surface of the petrous bone, at slightly increasing distances from this. It was too evident that the operation had failed to discover pus. It was also particularly noted that no change in the pulse or respiration had occurred during the operation.

The next day, March 27, temp. 97.2°, pulse 54. She vomited frequently in the course of the evening, and was dozing all night, though not asleep. She still complained of severe headache, but did not refer it to any one part of the head. 28th: Temp. 97.4°; pulse 56. No vomiting; desire for food; less headache. 29th: Temp. 97.2°; pulse 56. At 8 P. M., ten hours later, temp. 97.4°; pulse 50. 31st: 10 A. M., temp. 97.4°; pulse 56; respiration 16. April 1: 10 A. M., temp. 99.4°; pulse 54, small, irregular; respiration 19; semi-comatose; the right pupil dilated, the left contracted; muscular movement of right arm much better than that of left, the latter being distinctly weaker; epigastric, abdominal, and plantar reflexes normal; no ankle clonus. During this examination the face became flushed, and breathing slightly stertorous. The left forearm was convulsively pronated, and both hands and feet were spastically flexed. This attack passed off quickly, but was repeated four times in the course of the next hour, and whilst the wounds were being dressed. At midday paresis of the left arm was noted, and she was no longer aroused, even by being loudly spoken to. Reluctant to abandon the case without further effort for relief, at 3.30 P. M. the squamosa was trephined above the external auditory meatus, the dura mater divided, and a grooved director passed in the direction of the tegmen tympani: about half an ounce of thick, fetid, dark, greenish-yellow pus escaped. Shortly after this operation the pulse rose to 100, and an hour later to 128. At 7 P. M., four hours after the operation, the temperature was 100.2°; at 9.30 P. M., pulse 124, respiration 22, patient restless and insensible; the pupils equally dilated; there were slight, transient convulsions affecting the whole body. Death occurred at 5 A. M. on the 2d of April.

The post-mortem examination revealed no meningitis, except about the centre of the right middle temporo-sphenoidal convolutions, where, over an

area about the size of a shilling, the brain was adherent to the parietal layer of the arachnoid. It was also seen that the upper surface of the right petrous bone, close to the junction with the squama, showed several perforations, through which pus welled from the bone beneath into the cranial cavity. There was another perforation at the junction of the squama and the petrous bone, in the posterior fossa of the skull, where the lateral sinus grooves the latter. This had caused thrombosis of the sinus and complete obstruction of its lumen for the distance of half an inch. There was no sign of inflammation in the neighborhood of the cerebellar wound, nor was there any abscess in the cerebellum. The abscess in the temporo-sphenoidal lobe was a well-defined cavity, the size of a walnut.

The third case was one of chronic otorrhœa, with abscess in the cerebellum, evacuated by trephining the occipital bone. The patient was a lady, aged forty-five, seen in private practice. She had long been subject to a purulent discharge from the right ear. When seen by Mr. Hulke she was comatose; her cheeks and lips were bluish; and her breathing heavy, but not stertorous. Pulse slow, and temperature low. The illness began about sixteen days previous to the consultation. She then began to complain of aching in the right ear and right side of the head, with stiffness and uneasiness in the nape. These symptoms continued until four days before the consultation, when drowsiness was noticed, which increased to the time of the consultation, when it had become coma.

From the depth of the coma and the absence of left hemiplegia, Mr. Hulke was led to the diagnosis of abscess of the cerebellum, as these symptoms were unfavorable to the supposition of the existence of abscess in the temporo-sphenoidal lobe. The operation of trephining the occipital bone was then performed in a manner similar to that in Case 2. The immediate effects of opening the abscess were striking. The pulse was soon noted as 72; the breathing became easy; the cyanosis of the face disappeared; and the coma was less deep. Consciousness did not return, however, and the patient died in the afternoon of the day of the operation.

The concluding remarks of the author are as follows: "If it be objected that, as they were all three fatal, they fail to justify the treatment, a trial of which I advocate, I may fairly rejoin that this simply shows the powerlessness of trephining to relieve at the very late stage at which it was practised. In the future we must strive at perfecting the early diagnosis of abscess; and this once made, we must boldly and without hesitation apply the same general principles of surgery which govern the treatment of abscess in any less noble part of the body." It is perhaps a matter of regret that no aurist saw these cases, and we are therefore without any knowledge of the condition of the tympanic cavities in these subjects. In the opinion of the reporter, in cases like these the aurist and the general surgeon would do well to work together, supplementing each other's deficiencies in knowledge and diagnosis.

Certain Technical Details Relating to Operations on the Mastoid.

Dr. A. H. Buck presented a paper with the above title before the American Otological Society, July 20, 1886. He referred to the objections which had been made to the drill, in the operation of trephining the mastoid. It

had been stated that there is danger of plunging the drill into the lateral sinus, or even into the brain. He had, however, found no such tendency on the part of the drill. The size of the opening can be controlled by the size of the drill. He uses a drill one-fourth of an inch in diameter, until the antrum is reached, and finishes the operation with a smaller drill. This gives sufficient opening for drainage, but if a large sequestrum is present, a larger opening must be made. Pyæmia and septic fever are rare after the use of the drill. With a knowledge of the parts to be operated upon, the drill can be used with perfect safety. It can be guided perfectly by resting the fingers on the bone. The conical shape of the drill enables the operator to tell when its point has entered a cavity.

The objections to the use of a chisel were then taken up. Dr. Buck claims, very justly, in our opinion, that when the chisel is used, the wound in the adjacent parts must be larger than when the drill is used, and the opening in the bone is more extensive, thus leading to a depressed cicatrix. More time is required in using the chisel, and it is not free from danger. These objections would be trifling if the results of the operation performed with a chisel were more satisfactory than those done with the drill. But a study of the statistics of both methods shows nothing to warrant the statement that the employment of gouges and chisels is preferable to the use of the drill in establishing openings into the mastoid.

In operating with the drill, after making an opening, Dr. Buck cuts out a little canal for the escape of the discharges, for the opening made by the drill is covered by the flap when it comes into position. For the first four or five days after the operation the wound is irrigated with a bichloride solution, 1 to 2000. Dr. Buck, in his earlier operations, was accustomed to applying the drill a short distance in front of the vertical line, through the point of the mastoid; but now he makes a straight vertical incision, three inches long. By this means the mastoid is exposed where it curves into the meatus. The drill is then applied to the first flat surface. The only difficulty is to establish the final communication between the canal and the antrum.

In the discussion which followed this paper, Dr. J. Orne Green, of Boston, advocated the use of the drill; while it was opposed by Drs. H. Knapp, Noyes, and J. A. Andrews, of New York. Dr. Gruening uses the drill in acute cases, but the chisel in chronic cases demanding a large opening.

It will be highly advantageous, in the opinion of your reporter, when the Society of aurists will discuss rather *when* to use any form of perforators for the mastoid, rather than *what* to use. For a long time it has been very clear that the mastoid is operated upon too late; still, no one is able to point out the proper, safe, and early time to do it.

Dr. Knapp's case of "Fatal Termination of a Case of Sclerosing Mastoiditis, after Chiselling the Bone" (American Otological Society, July 20, 1886) shows the usual futility of such operations in chronic cases, which already present a free vent for pus through the perforated membrane and the external auditory meatus.

In Dr. Pomeroy's case of "Abscess of the Mastoid Cells where the Chief Indication for Operation was Elevation of Temperature," there was at least an endeavor to offer an indication to guide the surgeon in his decision to operate, though it is difficult to see how the presence of only "four to six

drops of pus" could have caused the elevation of temperature upon which the indication for opening the mastoid was based, especially as the membrana was already perforated by acute inflammation. It should have been borne in mind that the acute otitis could cause the fluctuations in temperature, and would also render the presence of serious mastoid disease highly improbable. The patient recovered from the disease and the operation, as might have been expected, as there was no chronic disease in the temporal bone, and hence no nidus of pyæmic poisoning, and the operation in itself, if done by one of experience, is of no grave moment.

But this very fact of the absence of great danger in the operation itself may lead to a reaction in favor of the too frequent or too hasty recurrence to it. The experience with this operation in the time of Baron von Berger should not be forgotten. It was considered so useful and so trivial that it was resorted to for the cure of tinnitus aurium in the person of von Berger himself. The opening in the mastoid was followed by injections into the cavity. Fever and delirium set in, and von Berger died on the eleventh day, of purulent meningitis.

Epileptiform Attacks Caused by Simple Chronic Non-suppurative Otitis Media.

Dr. Noquet, of Lisle, in a paper with the above title, considers the well-known phenomena of aural vertigo, with simply another name. The sketch of the disease is well presented, abundant reference being made to French authors, but there is nothing new in the article. His concluding remarks, as they apply so well to the important disease known as aural vertigo, bear some repetition here. It is, indeed, a most distressing malady, as in most cases the sufferer is pronounced to be an epileptic, he loses his situation, or is hindered in his private affairs on account of his supposed attacks of epilepsy. In reality, his malady is due to an ear disease, of which he is ignorant, and to which it often happens that nothing will especially direct his attention. The author, therefore, insists upon the importance of examining the ears of all patients suffering with vertigo, or with epileptiform attacks, even if the subjects themselves are unconscious of any unfavorable aural symptom.

Tinnitus Aurium in Affections of the Stomach.

Dr. E. Ménière has given the results of his observations upon the effects of gastric diseases on the ears, as indicated by the production of tinnitus aurium (*Revue Mensuelle de Laryngologie, d'otologie*, etc., Juin, 1886). He begins by the announcement of the common experience of aurists, that a large number of those suffering from tinnitus are entirely free from any aural conditions to account for this distressing symptom. Deafness may, indeed, be present in a patient suffering from tinnitus; due, however, to a stomachic disorder. He refers to the theory of Woakes, of London, that the tinnitus in such cases is due to an affection of the internal ear. This part of the ear being supplied exclusively by the vertebral artery and its branches, which are closely connected with the inferior cervical ganglion, and this ganglion being supplied with a branch from the pneumogastric nerves, any disturbance in the latter is reflected to the vertebral artery, its calibre is increased, and passive congestion of the labyrinth, especially of the cochlea, ensues.

The conclusions of Ménière are as follows:

It is possible to become deaf through disease of the stomach.

Otologists should always seek most carefully for any possible connection between tinnitus aurium and disease of the digestive tract.

The diagnosis is rendered more exact by the absence of disease of the external or middle ear.

The noises may arise even before marked symptoms of stomachic disease. Generally, however, they appear near the second or third year of chronic gastric derangement, or even later.

According to Ménière's observations, the noises generally affect only one ear.

The deafness is variable. Sometimes it is profound, and then it is incurable. Diminution or increase in the noises follows closely, in some cases, an increase or decrease in the dyspepsia.

Treatment, as a rule, gives only moderately good results. Nevertheless, static electricity has proven of value, in Ménière's hands, in the acute stages of the noise (he does not state how it is to be applied). The most rational indication is most carefully to guard the stomach, the point of the origin of the malady. Bromide of potassium in large doses, if endured by the patient, is of use in some cases. Finally, it is to be feared that the lesions in the internal ear, though slight, are constant enough to cause persistence of the noises to a greater or less degree.

DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

UNDER THE CHARGE OF

J. SOLIS-COHEN, M.D.,

PROFESSOR OF DISEASES OF THE THROAT AND CHEST, PHILADELPHIA POLYCLINIC.

Treatment of Diphtheria by Fumigations of Coal Tar and Turpentine.

M. Cadet de Gassicourt (*Union Médicale*, 20 Mai, 1886, No. 68, p. 828), referring to his report last year of the poor results obtained in the Hôpital Trousseau, reports his more recent experience. Experiments upon false membranes referred to the direct action of these vapors in a capsule for several hours, or even an entire day, showed that the effects were *nil*, the membranes being simply colored black. In twelve patients in the stage of continuous stridor, not one exhibited the slightest amelioration, and all twelve had to be submitted to operation. The thick, black smoke augmented the cough and the paroxysms of suffocation. In the sole case benefited, the disease was found the next day to have been stridulous laryngitis. In a quarter of an hour the canula of a tracheotomized infant became so obstructed with the carbon that the outer tube had to be removed several times as well as the inner tube. This child died with pseudo-membranous bronchitis, and the carbonaceous

dust was found as far as the ultimate bronchial ramifications. In some experiments by Dr. Frémont on tracheotomized rabbits and guinea-pigs traces of carbon were found not only in the bronchi but in the subpleural connective tissue, in the alveoli, and in the foci of broncho-pneumonia which had been developed around the carbonaceous masses.

The Nasal Douche.

Dr. E. J. Moure, of Bordeaux (*Rev. mens. de lar.*, etc., Juillet, 1886, p. 415), describes and illustrates a modification of the nozzle, intended to prevent patients from injuring themselves by directing the fluid upward. An olive-shaped extremity of the nozzle is bent nearly to a right angle with the shank, so as to occupy the floor of the nasal passage when introduced. A nozzle constructed on this principle, but not quite so angular, devised several years ago by Dr. Lefferts, of New York, in connection with a spray producer, has long been widely used in America.

The Relation of Diseased Nasal Mucous Membrane to Asthma.

The subject has been copiously discussed in recent numbers of the *Deutsche medicinische Wochenschrift*. M. Bresgen reiterates his belief that all asthmatics suffer with some degree of chronic catarrh of the upper air-passages, especially those of the nose; and that many of the cases, if not, indeed, all of them, are curable by rhinochirurgical treatment. He still maintains that the main seat of the malady is almost exclusively situated in the swollen mucous membrane of the inferior turbinated body, and in the anterior portion of the middle turbinated body, the turgescence of which structures he considers altogether as abnormal. Hence topical surgical treatment which destroys this tissue will cure the asthma, or give great relief. Electrocauterization is preferred in freely accessible localities, and cauterization by chromic acid in those less accessible, cocaine being applied first to prevent pain or to mitigate it. Failure in the treatment is attributed to lack of skill in the manipulation, or want of thoroughness in its prosecution. Distrust in these remedial measures is believed to indicate lack of knowledge in discriminating pathological from normal tissue.

W. Lublinski (*Idem*, Nos. 23, 24, 1886) summarizes the literature chronologically, and combats the views of Hack as to the dependence of the paroxysms on the erectile tissue of the turbinate bodies considered as a connecting link between irritations in the nasal passages and nervous excitation outside, the entire chain being controllable by operative destruction of this link. With other observers, he attributes the phenomena primarily to irritation of the terminal endings of the fifth nerve in the nasal passages, or of the endings of the olfactory nerve, as may be. He believes that there is always, in asthma, some diminution in the calibre of the bronchi and some spasm of the diaphragm; and that the nervous paths for reflex action are abnormal in all instances of neuroses of nasal origin. Many of his patients were hysterical, poorly nourished, or physically depressed; females predominating in public practice, and most of the males having suffered reverses of fortune; while in the more equable distribution of the sexes in private practice most of the males were hard intellectual workers without sufficient recreation. Lublinski has seen but seven instances of asthma in seventy-nine cases of nasal polyp. Varicose

thickening of the turbinates excites asthma, and doughy swellings of the septal mucous membrane is the next most frequent cause. Posterior thickenings of the turbinates produce rather a pseudo-asthmatic dyspnœa by occlusion of the nasal passages while the subject is in the horizontal position; a condition relieved temporarily by breathing through the mouth, and permanently by destruction of the tissue. While admitting the importance of topical treatment, Lublinski insists on proper treatment of the constitutional condition, and warns against the abuse of the electric cautery, enumerating a number of untoward sequelæ. During the past three and a half years Lublinski found nasal disease in 143 cases of asthma; hyperplastic rhinitis in 53; hypertrophy and granular enlargements of the lower turbinate body in 21; of the middle body in 11; atrophic rhinitis in 7; polypi in 7; deviations and exostoses of the septum in 9; hypertrophy of the tonsil in 5; various pharyngeal affections in 28. Of the 143 cases, 27 were cured, and 13 improved; 53 per cent. having become unfavorable subjects by reason of alterations in the lungs. Immediately good results were produced only in the cases with polyp. The remaining cases require careful after-treatment, constitutional and topical. Internal medication, previously useless, was often found useful after operation, reference being made to the administration of iodine and nerve tonics.

Dr. Böcker (*Idem*, Nos. 26, 27, 1886) likewise summarizes the special literature of his theme; he contests the views promulgated by Hack, presenting in his arguments a number similar to some of those of Lublinski. He calls attention to the observations of Johann Müller, who found that the system of respiratory nerves can be excited to convulsive action by local irritation in all parts of the body covered with mucous membrane. Far from considering turgescence of the turbinate cavernous mucous membrane as abnormal, he regards it as a salutary physiological process to prevent access of irritants from without. He limits the designation nervous asthma to cases in which, without perceptible change in the lung tissue, in the brain, or in the track of the pneumogastric, a sudden expiratory dyspnœa occurs associated with a spasm of the diaphragm and of the bronchial musculature. But while no doubt is felt as to a connection between the nose and asthma, the question is put as to how far the asthma is to be attributed to nasal reflex, and how far to an alteration in the chemic interchanges of respiration. Not only do nervous and neurasthenic individuals get asthma from irritating the olfactory ending by the emanations from violets, roses, ipecacuanha, and perfumes, but psychical influences may be operative, as in John Mackenzie's patient, who got asthma from an artificial rose, and in those in whom the paroxysms are excited by extinguishing their night lamps. Such idiosyncrasies can often be relegated to an exalted reflex irritability. Attacks at night being probable, the darkness in its mental association with night excites the paroxysm. He attributes to mechanical causes many examples of what has been explained as reflexes; the nasal disorders being sometimes coincidental, and sometimes a mere favoring condition. Even the disappearance of asthma after operations within the nose is no proof of the reflex character of the asthma. A large majority of the patients with asthma have no intranasal lesions, although slight deflections and prominences of the septum, slight congestions and relaxations of isolated portions of the mucous membrane, may be found in every individual. Relationship between asthma and pathological conditions

of the nose, therefore, must not be taken for granted, but must be substantiated. Operations are requisite in all conditions interfering with due respiration, such as polyps, tumefactions, marked protuberances, cavernous and papillary tumors; but cauterization, especially by burning, is to be avoided in desiccative catarrh. Catarrhal conditions are to be combated by the customary measures, but the chief reliance is always to be placed upon treatment of the constitutional condition. Böcker has seen but nine instances of true asthma in three hundred and ten cases of polypi upon which he had operated, and these nine patients remained relieved until recurrent polypi reproduced asthmatic paroxysms. Absolute cure could not be claimed in any of them, either because the patients had had to submit to operation several times, or because the periods after operation were too short to justify positive conclusions. The periods from which these cases have been reckoned date from 1877. Some of the patients remained relieved for several years. Böcker believes that cures of cases have been heralded too soon. Remissions and subsidences, sometimes years in duration, occur without operation, and then paroxysms suddenly recur with their old severity. In the cases of hay fever treated by electric cautery, an absolute cure did not ensue in a single instance; while better results followed in the cases treated with insufflations of quinine sulphate, and the insertion of pervious wads of cotton.

Intranasal Disease and Exophthalmic Goitre.

Prof. Hack, of Freiberg, records (*Deutsche med. Woch.*, 1886, No. 25) an example of exophthalmos reduced by cauterization of pronounced hyperplasia of the erectile tissue of the mucous membrane of the lower turbinated bones. The nervous cardiac palpitation ceased, too, and the enlarged thyroid gland became smaller and softer. Hack attributes the disease in his case to permanent irritation of certain peripheric terminal apparatus of the sympathetic expanded in the erectile tissue of the nasal passages. It thus presents an analogy with the large series of reflex neuroses to which for several years Hack has been calling attention, as excited by intranasal disease.

Hay Fever.

In a contribution to the study of hay fever, so-called (*Medical News*, July 17, 1886, p. 59), Dr. Beverly Robinson, of New York, takes a modest but decided stand against the tendency to attribute all paroxysms of this disease to obstructed conditions of the nasal passages, and he points his argument with a few illustrative examples from his own practice. While acknowledging the propriety of topical treatment by electric cauterization of hypertrophied intranasal soft tissue in cases of complete and very great occlusion, he reiterates his belief that in less aggravated forms of obstruction almost equally good results may be secured by using pure carbolic acid or chromic acid. Finally, he recognizes the importance of treating defective constitutional conditions, and expresses the opinion that the direct influence of morbid intranasal conditions cannot be correctly estimated until the influence of existing systemic disorders has been eliminated in this manner or in some other.

Tuberculosis of the Larynx.

Prof. Massei, of Naples, recognizes (*Rev. men. de Lar.*, etc., June, 1886) several forms of tuberculosis of the larynx: 1, ulcerative; 2, arytenoidal perichondritis; 3, infiltration of the vocal bands; 4, nodular foci of the vocal bands; 5, vegetant polypoid. He finds that applications of iodoform in ether almost always give better anæsthetic results than cocaine, the effects of which, though prompter, are more evanescent. He recommends that the use of iodoform or of lactic acid be preceded by sprays of corrosive sublimate, 1:1000, as productive of more rapid results.

Lactic Acid as a Curative Agent in Tuberculous Ulcerations of the Larynx.

Dr. Hering, of Warsaw (*Idem*, July, 1886), summarizes the literature of the subject, and analyzes a table of twenty-two cases in his own practice, with the result following: Complete cicatrization with notable amelioration of the lungs and general condition in 2 cases; cicatrization without amelioration of general condition in 2 cases; partial cicatrization, but recurrence with aggravation, owing to pulmonary tuberculosis and fever, in 2 cases; amelioration of the aspect of the ulceration in 3 cases; amelioration of deglutition in 4 cases; death in 2 cases. From a study of the table, it appears that isolated ulcerations in the epiglottis and vocal bands are most amenable to cicatrization under lactic acid. Ulcerations in the ventricular bands and in the posterior portion of the larynx are much less successfully treated. An absence of cases of pyriform swellings is to be noted in the table. In cases of infiltration it is recommended to precede the treatment by deep incisions after the method of Schmidt. Treatment by incision, it may be interpolated, was recommended by Cutter, then of Boston, years before it was advocated by Schmidt. For details as to method of application, general treatment, and special recommendations, reference must be made to the original.

Tuberculous Tumors of the Larynx.

Dr. Percy Kidd summarizes (*St. Bartholomew's Hospital Reports*, London, 1885, xxi. p. 37) 9 cases—2 reported by Mackenzie, of Baltimore, 3 by Schnitzler, and 4 by himself, as follows: In 3 cases there was a single tumor, in 2 cases there were 2 tumors, in the remaining 3 cases they were described as numerous. In every case their surface was smooth and their shape rounded. Their size varied from that of a pea to a hazelnut or small cherry. In 5 cases they were unaccompanied by ulceration. In 1 case the development of the tumor was followed by ulceration after some time, and in 3 instances they were associated with ulceration when first observed. Their situation was as follows: Ventricles in 3 cases; whole upper part of larynx in 1 case; interarytenoid fold in 2 cases; aryepiglottic fold in 1 case; membranous part of trachea in two cases. Probably they may originate in any part of the larynx or trachea. As to the advisability of removing such tumors, if the growths are large or their situation is such as to interfere with respiration, an attempt should be made to remove them either wholly or in part. Otherwise it would be well to leave them alone.

Spasm of the Larynx and Epilepsy.

In an article on laryngospasmus by Prof. H. Widerhofer (*Allgemeine Wiener med. Zeitung*, June 22, 1886, p. 304), it is stated that in nurslings epilepsy usually begins in the guise of spasm of the larynx, which continues at intervals for weeks or months, and becomes undoubted epilepsy in the second or third year. Sodium bromide is recommended in large doses: one-fourth of a gramme morning and evening in a spoonful of sweetened water.

Laryngeal Neuroses of Central Origin.

Dr. H. Krause, of Berlin (*Arch. f. Psychiatrie und Nervenkrankheiten*, Berlin, 1886, Bd. xvii. H. 1, S. 288), examined some two hundred patients, with various central affections; those chiefly noted as causing functional disturbances of the larynx, comprising spinal syphilis, chorea, cerebral tumor, hemiplegia, plumbic paralysis, hystero-epilepsy, epilepsy, aphasia, railway spine, pseudobulbar paralysis, progressive paralysis, multiple sclerosis, bulbar paralysis, and tabes. The results of these observations are summed up as follows:

Chorea. Tremulous action of feebly distended vocal bands and paresis of the abductors in almost all instances. Choreic movements of the laryngeal muscles in none.

Spinal syphilis. In one case the left vocal band was immobile near the middle line, but became functionally active again in connection with return of function in the left extremities under treatment by inunction.

Plumbic paralysis. No laryngeal manifestations in six cases. In one case paralysis of left vocal band. In another, conspicuous tremulous movements of the vocal bands and adductor paralysis.

Cerebral tumor. In a case of gliosarcoma of the corpus striatum and left temporal lobe, the right half of the larynx was paralytic. This case confirms the existence of a cerebral centre for the laryngeal muscles, although of no value toward indicating its precise location.

Hysteria, hystero-epilepsy, and epilepsy. Hemianæsthesia of the mucous membrane of the nose, the soft palate, the pharynx, the larynx, and the trachea, mostly on the left side, as in the other parts of the body. In one instance perverse action of the vocal bands, namely, approximation on inspiration, and widest separation in expiration and phonation.

Railway spine. In two cases with widespread cutaneous anæsthesia, anæsthesia of the mucous membrane of the upper air-passages, except at a few irregular spots.

Pseudobulbar paralysis. One case showed marked adductor paresis of the right and total paralysis of the left vocal band. The left extremities were lamed. Post-mortem examination revealed several distributed foci in the medullary portion of the cerebrum.

Aphasia. Of four cases, one showed, during five weeks of observation, steadily increasing debility in the motor disturbances of the larynx, paresis of the voice muscles in fact, so that phonation was very laborious and the voice became deep and gruff.

Progressive paralysis. Nasal speech dependent on paresis of the soft palate;

deepening of the voice from relaxation and atrophy of the vocal bands; maintenance of the functions of the respiratory muscles.

Multiple sclerosis. The same as in progressive paralysis.

Progressive bulbar paralysis. Frequently unilateral paresis or complete paralysis of the soft palate, the constrictors of the pharynx, and the muscles of the larynx, with sensory disturbance also in sequence. Sometimes unilateral or bilateral median position of the vocal bands, such as has been hitherto exclusively attributed to paralysis of the posterior cricoarytenoid muscles, and which, as shown experimentally by Krause, is, in a great number of instances, produced by spastic contraction of the adductors; a view supported recently by A. Köhler, and particularly by Gerhardt and by Michael. In proof that this pathogenesis occurs in central lesions also, a case was adduced in which, after syphilitic infection during the course of bulbar paralysis, an intense sensation of choking occurred very suddenly, followed by continuous dyspnœa. The vocal bands in this case stood continuously immovably approximated, and so distended in the median position that the expiratory phonatory current of air could not set them in vibration, but vicariously set the ventricular bands into vibration. Post-mortem examination revealed, among other lesions, a fusion of the dura mater with the arachnoid, and irregular infiltration of the lower portion of the floor of the fourth ventricle. Here the differentiation can be only between spastic contracture and reflex contracture in consequence of a lesion of the nucleus of the superior laryngeal nerve. In a second case dyspnœa likewise occurred quite suddenly, while the patient was on the street, and was found due to bilateral adductor contracture.

Tabes. Of thirty-three cases, thirteen showed gross functional disturbances; pareses and paralyses of all varieties, that sometimes come and go and recur. At the same time, there are no gross voice disturbances in many instances. He cited a tabetic teacher who took part in concert singing despite paralysis of one vocal band. The most conspicuous appearance was true ataxia of the vocal bands, which moved outward with arrest half way to the abduction or inspiratory position; similar to the backward movements of the bulbi designated by Friedreich as ataxic nystagmus. In three cases with laryngeal crises there were characteristically irritative laryngeal manifestations with bilateral adductor contracture in each instance. Pencillings with cocaine were followed by marked diminution in frequency and intensity of the attacks, and in a case in Gerhardt's clinic even entire subsidence at times; a combination of phenomena which justifies Krause in maintaining a connection between these irritative manifestations and the paroxysms. Inasmuch, too, as degenerations of the vagus are found in cases of laryngeal crises, Krause concludes that the objective manifestations are due to reflex contracture of the adductors produced by the degenerative irritation in the superior laryngeal nerve, and that these manifestations are occasionally increased to complete spastic closure of the glottis by central or peripheral irritation.

In the discussion of this paper, THOMSEN called special attention to one of the cases of general progressive paralysis in which dyspnœic paroxysms and pareses of the laryngeal musculature preceded the manifestations of psychic disturbance. REMAK controverted Krause's opinion as to unilateral adductor distention in central lesions with associated degenerative manifestations, cir-

cumstances under which the contracture would be secondary, as in paralytic clubfoot, in infantile spinal paralysis, or in congenital deficiency of certain spinal cord territories, as in his case of spina bifida. Krause, in reply, did not deny the occurrence of central or peripheric abductor paralysis; but did not believe that partial paralysis of the vago-accessorius nucleus, even when applicable to special cases, explained either the sudden onset of adductor contracture in certain other cases, or the constancy of manifestation in those previously described. The latter class of cases are explained better by assuming a lesion which affects all the nerve-fibre roots in the same degree; the adductor impressions from an irritative condition of all the fibres predominating, as issuing from the more powerful muscle group just as they do upon experimental electric irritation.

Laryngeal Paralyses.

Dr. J. Charazac, of Toulouse, in a communication made to the French Society of Otology and Laryngology, April 30 (*Rev. Mens. de lar.*, etc., Mai, 1886, p. 241), discussed the question whether the abductor fibres of the recurrent are always affected first. After presenting a summary of the views of Semon, of London, and those of Hooper, of Boston, he reported a case of cystic goitre, in a man fifty years of age, with unilateral paralysis of the adductors consecutive to pressure upon the right recurrent nerve, and hence came to the conclusion that while the abductors have a tendency to become paralyzed before the adductors, they are not always affected first.

In a paper based upon experimental work presented at the recent annual meeting of the American Laryngological Association (*Medical News*, June 12, 1886, p. 659), Dr. F. H. Hooper, of Boston, shows that factors other than neurotic ones are often present to produce the abnormal positions of vocal bands frequently attributed to paralysis, and especially to paralysis of individual muscles. These factors are the relative sizes of the component structures of the larynx, such as the posterior vocal processes, the cartilages of Wrisberg, the aryepiglottic and thyroepiglottic muscles, and other peculiarities which, in individual instances, may have much to do with determining the position which vocal bands shall take both in normal and in diseased conditions.

Dr. J. Solis Cohen presented to the American Laryngological Association the larynx and some microscopic sections of nerve tissue from the case of bilateral paralysis of the posterior cricoarytenoid muscles which he had exhibited in 1879 (*Medical News*, June 12, 1886, p. 660), and which had begun as a unilateral paralysis of the left side, with a marked tendency to spasm on titillation of the left auditory meatus. The larynx showed the fixed spastic position of the vocal bands in the middle line that they had occupied for nearly ten years during life. The posterior cricoarytenoid muscle of the left side was quite atrophied, that of the right side was much less atrophied, but the bundle of fibres of the arytenoid going from the base of the left cartilage to the top of the right was equally atrophied, and all the remaining muscles were apparently normal. The right recurrent laryngeal nerve, near to the point where it leaves the pneumogastric, showed marked atrophy of one-half of its area; the left nerve showed no pathological change. A small triangular cavity, two to four millimetres in extent, was found in the outer section of the lenticular nucleus.

Feeding by the Stomach-tube after Tracheotomy.

Mr. S. Herbert Habershon reports (*St. Bartholomew's Hospital Reports*, 1885, xxi. p. 79) five cases of recovery out of seven tracheotomies for membranous laryngitis, in which an important element of the success is attributed to the plan adopted by Dr. Bullar in feeding the patient through a soft catheter or elastic tube passed directly into the stomach through the nose.

Laryngectomy.

Dr. J. Baratoux, in a study of this subject (*Le Progrès Médical*, March 27 and April 10, 1886, pp. 263, 308), presents a chronological table of 102 cases, of which 5 were too indefinite for analysis. Of the other 97, 14 were partial extirpations, 83 complete. Of the former there were 8 recoveries and six deaths; of the latter, 24 recoveries, 58 deaths, and 1 result unknown. Among the recoveries are included 5 complete laryngectomies of less than two months' standing, for carcinoma, 2 of which had been operated upon but a few days. Leaving these 5 out of consideration, there have been 47 deaths in epithelioma cases and 15 recoveries, if patients surviving from two months to a year may be counted as examples of recovery. One-third of the whole succumbed during the first week to shock, exhaustion, pleurisy, pulmonary embolism, hemorrhage (2), collapse (3), or pneumonia (11). One-fifth of the survivors succumbed before the end of the first month, six of them by pneumonia; and before the end of the fifth month more than one-third of the remaining survivors had succumbed. In sarcoma the results were better. The 7 deaths occurred between the seventh and eighteenth month, recovery having resulted in nearly half the cases, 3 of them still living at the end of three, five, and six years. Of 10 patients operated upon for stricture, stenosis, etc., more than two-thirds died, 5 of them in less than three months, 1 in less than six, and the last one in less than a year. Taking all the cases of total extirpation together, death occurred in half of them before the fourth month, and in more than two-thirds before the sixth month, except in the cases of sarcoma, which present but two instances of death so early. Taking all the cases of partial extirpation, recovery ensued in more than two-thirds. Following this analysis, indications are given for operating. Total extirpation seems to be indicated in malign neoplasms occupying more than one-half of the larynx but not yet extending into the neighboring tissues, provided the patients are not too advanced in life. Nevertheless, one of Hahn's patients sixty-three years of age survived three and a half years. It is contraindicated in all cases of benign neoplasm, papillomas, perichondritis or necrosis, in malign tumors which have invaded adjacent or distant organs, and in patients laboring under some additional grave malady. Partial is preferable to complete extirpation, because recurrence is no more apt to follow, and because an artificial substitute will not be necessary. It should be practised in cases of malign neoplasms confined to one-half of the larynx, in certain strictures due to fibrous transformations of tissue and hypertrophied and ossified cartilage which prevent ordinary methods of dilatation, but it should not be practised to cure simple strictures, papillomas, perichondritis, or necrosis. Following these remarks, Baratoux gives a description of the various operations, procedures, and subsequent manipulations.

DERMATOLOGY.

UNDER THE CHARGE OF

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HYDROA.

CROCKER (*British Medical Journal*, May 22, 1886) is among those who consider the term "hydroa" a rightful addition to our nomenclature, and as including diseases distinct from the pemphigus and herpes groups. Many forms of hydroa have been described, but most all of these may be properly placed under one head—"hydroa herpetiforme." This affection is variously described as "pemphigus pruriginosus" (Chausit and Hardy); "herpes gestationis" (Milton and Bulkley); "herpes circinatus bullosus" (Erasmus Wilson); and "dermatitis herpetiformis" (Duhring). It is now well known that this disease is not, as has been supposed, confined to pregnant women. The author gives a detailed report of eight cases which came under his observation in the last year. Although the lesions of hydroa herpetiforme are usually erythematous, vesicular, and bullous, they may also be pustular. Crocker cannot yet agree, however, with Duhring in considering impetigo herpetiformis of Hebra identical with this disease. The affection differs in several particulars: in the total absence of erythematous, vesicular, and bullous lesions, the eruption being pustular throughout; in the absence of pruritus; in fact, that the general symptoms are severe, and in all but one case terminated fatally.

From a study of the literature and personal cases the following conclusions are adduced: 1. There is a group of diseases—distinct from pemphigus, herpes, and erythema exudativum, whilst sharing some features with all of them—for which the term "hydroa herpetiforme" is convenient, and has the advantage of being already partially adopted. 2. It would give greater clearness to the term hydroa if it were restricted to diseases of the type discussed, and not made to include diverse anomalous bullous eruptions. 3. The feature which characterizes the group is the presence, at some period of the disease, of erythema, chiefly, but not exclusively, of a circinate type, of vesicles, bullæ, or pustules, with a tendency to group herpetiformly. These different elements are present in varying ratio to each other, now one, now another, predominating and overshadowing the other; but the disease is always accompanied by intense pruritus, and the eruption tends to undergo evolution and involution at the periphery and centre respectively. The disease generally runs a long, but ultimately favorable course, with frequent exacerbations and remissions, with a strong tendency to recur, even after long intervals, but it is generally amenable to careful, persevering treatment. The author advises an improvement in the patient's general surroundings, proper and nutritious

food, and mental and bodily rest. Arsenic has proven a most reliable remedy, but must be given in increasing doses, even to its physiological limit. In some cases, in which arsenic failed, good results were obtained with tincture of belladonna in full doses. In debilitated patients, cod-liver oil is indicated, and in some cases quinine, in two to five grain doses, as recommended by Tilbury Fox, proves useful. The best local application, in the author's experience, for the control of the pruritus, is a lotion consisting of two drachms of liquor carbonis detergens, to eight ounces of water.

A Case of Lichen Planus.

A marked, and in some respects exceptional, case of lichen planus is reported (*Lancet*, July 17, 1886, p. 124) by Finny. The eruption occurred upon all parts, except the head and face. The patient, a female, aged fifty-three, at the time of outbreak was suffering from nervous prostration. The disease began in small patches below the knees and rapidly invaded other parts. It was most marked, both as regards size of the papules and extent of the patches over the back, loins, abdomen, and vastus internus of the thigh. The papules in the palm and soles were few and scattered. Extensive plaques were formed by contiguity of papules rather than by confluence, and gave rise to a "peculiar tessellated or mapped-out appearance of the skin." The papules were smooth, waxy, or glazed, some of which exhibited a slight filmy desquamation. The case yielded rapidly to arsenic. Of the local remedies employed, warm alkaline baths and lotions of carbolic acid and liquor carbonis detergens gave the most relief.

Cases of Orbital Nævi Treated by Electrolysis.

Several cases of nævi about the orbit, successfully treated by electrolysis, are reported (*Lancet*, July 24, 1886) by Snell. A current of six to ten cells usually suffices, several punctures being made, with the negative pole, at the one sitting, the needle of the positive pole being kept stationary. The patients, five in number, were all infants, varying in age from early infancy to nine months. Several operations, at intervals of several days or weeks, were usually required for complete success.

The Relation of Lupus Vulgaris to Tuberculosis.

A communication based upon clinical study of the relationship of lupus vulgaris to tuberculosis is made (*Deutsche medicinische Wochenschrift*, June 17, 1886) by Max Bender. In three years 374 cases of lupus came under observation, but for lack of notes and history, the analysis, as regards the point under consideration, is based upon an aggregate of 159 cases. In 99 (62.3 per cent.) of these cases present or past evidences of tuberculosis were noted. Hereditary predisposition was disclosed in 53 cases (33.3 per cent.). From the history alone the relationship was disclosed in 77 cases (48.7 per cent.). At the time of examination other evidences of tuberculosis were present in 76 cases (47.7 per cent.). Based upon the history and present condition the whole number in which a positive relationship was shown, was 109, or 68.5 per cent. Two of the cases while under observation died of other forms of tuberculosis—one, of tubercular meningitis, combined with caries of the petrous bone, and the other, of laryngeal and pulmonary tuberculosis.

Incidentally to the main purport of the paper, the comparative frequency of lupus vulgaris upon the different parts of the body is given, based upon the whole number (374) observed: face in 115; nose in 70; upper extremities in 40; cheeks in 35; nose and face in 25; lips in 16; nose and lips in 15; lower extremities in 15; face and neck in 12; face and extremities in 6; temporal region and forehead in 6; chin in 3; face and arm in 3; ear in 3; entire body in 2; scalp in 2; eyelids in 2; palate in 1; hand and foot in 1; nape of neck in 1; back in 1.

Molluscum Contagiosum—an Analysis of Fifty Cases.

Allen (*Journ. Cutan. and Ven. Dis.*, Aug. 1886) has had opportunity, in a children's asylum, of treating a large number of cases of this disease. The disease, as stated by an attendant, was first observed on a young girl brought to the institution a year previously, since which time other children had become affected, numbering in all about fifty cases. The favorite sites for the eruption were, in the order named, eyelids and region about the eye, other parts of face and neck, nose, lips, hands, chest. In eight cases of those affected were found also common warts. On the arms of several patients was noted a flat variety of wart with pink border, resembling in a measure the molluscum tumor, excepting that it had no central opening, was of firm consistence, difficult to remove, and did not present the gland-like structure. In addition to the asylum cases, the writer mentions a case which came, in 1883, to the New York Hospital. This patient was a married woman, aged twenty-five, and presented a group of molluscum tumors on the neck, which had appeared several months before, "at a spot where her child, who also had the disease, rested his face when she carried him." Subsequently the child referred to was seen, and still showed the presence of the disease in the face. Several efforts at reproduction by inoculation were practically negative.

The cases, as the author states, do not bear out the suggestion offered by some writers that irritation of the skin is a potent factor in the production of the disease. Although scabies existed in the asylum at the same time, many of those who had molluscum did not have scabies, and the faces thickly studded with mollusca were, as a rule, remarkably free from scabies, and scarcely a tumor was found upon the scratched and irritated body. Nor did the cases add to the theory that maceration of the skin and frequent bathing favor the production. The author thinks, however, that maceration or moistening of the surface from perspiration, as when the face of an infected child presses against the mother's face or breast, may favor the propagation by contact, by affording a more favorable nidus for the contagious principle. Although not assuming to discuss the disease pathologically, the writer incidentally states that the presence of the mollusca upon the vermilion border of the lips, as observed in several of his cases, is a strong clinical point against the theory of its origin in the sebaceous glands. Other authors are quoted in support of the contagious nature, a view in which the writer, for the following reasons, shares:

1. The cases reported by Bateman, Mackenzie, Fox, Liveing, and others, and the one mentioned in this paper (New York Hospital case), where the child first had the disease, and the mother afterward, upon the face, neck, or breast, are difficult of explanation by any other theory. 2. The spread of the

disease in families, schools, and institutions. Liveing (*Lancet*, Oct. 5, 1878) reported nine cases occurring coincidently in a school. 3. The fact that the parts exposed to contact are those almost solely affected: the face in children, the breasts in mothers, and the genital region in adults, and especially in prostitutes and the men who visit them. 4. The reported successful inoculation. 5. That negative evidence has no weight. It is not always possible to inoculate other diseases which are well known to be contagious.

Notes upon Lanolin.

G. H. Fox has contributed a brief summary of his experience with lanolin. Regarding the absorbability by the skin, comparative experiments were made. On one forearm of a young girl, a certain quantity of lard was rubbed in for a specified length of time; on the other, the same was done with lanolin. It was found that two-thirds of the lanolin had disappeared, and but one-third of the lard. Another and similar experiment made with lard and vaseline showed that the former was somewhat more readily absorbed than the latter, but the difference was slight. Liebreich stated, as proof of rapid absorption of drugs by means of lanolin friction, that an ointment of one part of corrosive sublimate to one thousand parts of lanolin rubbed into the skin will produce a metallic taste in the mouth; Fox failed in numerous experiments, personal and upon others, to get this evidence of its absorption. In some subjects of experimentation, the author adds, this "metallic taste was noted; but it is possible that a similar effect might have followed the use of lard or even vaseline." Respecting its clinical value, the author failed to see any remarkable beneficial results from its use; but, on the contrary, found in some instances its color and consistence objectionable. Moreover, in some acute inflammatory cases, it was not found to be so bland as had been represented. Used side by side with vaseline or lard in the same cases, patients usually expressed a preference for the latter. Nor was it absorbed so readily as to attract the patient's notice to the fact. The writer concludes: 1. Lanolin is more readily absorbed by the skin than any other fatty substance. 2. As a basis for ointments it is useful when an effect upon the deeper skin or upon the whole system is desired. 3. On account of its firm consistency, it is advisable to mix with it a certain amount of lard, especially in cold weather. 4. When applied to a highly inflamed skin, lanolin may not prove as bland as *fresh* lard or *pure* vaseline. 5. Considering its recent introduction, its questionable superiority, and its present cost, it cannot be recommended, as yet, as the best basis for all ointments.

The advantages of lanolin as an ointment basis, as asserted by Liebreich, are confirmed (*Brit. Med. Journ.*, June 12, 1886) by W. G. Smith, who states that its several properties entitle it to careful consideration. "It is capable of absorbing and intimately blending with large amounts of water, standing thus in marked contrast to popular notions of the mutual relation of water and fats. The lanolin of commerce is a combination of neutral cholesterin-fat with about thirty per cent. of water. 2. It is neutral to test-paper, is not liable to rancidity, and is not easily saponified by alkalies. 3. It is miscible with glycerine, unlike other fats. 4. It possesses the power of penetrating the epidermis rapidly, and in a remarkable degree. 5. Hence lanolin greatly facilitates the absorption through the skin of drugs mixed with it. So marked

is this that, with poisonous drugs, such as the toxic alkaloids, about half the usual proportion should be prescribed as ointments. The vaselines and paraffines hinder, rather than favor, the passage of drugs into the skin." Several cases are given in illustration of its favorable effect. In a case of eczema rubrum of the legs, which had been under treatment by the more common methods, a speedy cure was effected by using an ointment consisting of lanolin ʒxij; adipis benz. ʒj; liq. plumbi subacet. ♏xv; acidi carbol. ʒij; ol. lavand. ♏v. In a case of psoriasis lanolin was used as a basis for chrysarobin (twenty grains to the ounce) with favorable result. In chapped hands, friction with the pure lanolin was satisfactory. In the author's experience lanolin was found non-irritating. For general use, its stickiness should be counteracted by the addition of one-eighth to one-fourth its proportion of another fat, such as lard, castor oil, etc.

LIEBREICH (*Brit. Med. Journ.*, July 17, 1886) calls attention to an improved preparation of lanolin—lanolinum purissimum. The earlier product contained the not readily fusible cholesterine ethers and rendered an addition of fat or glycerine necessary in order that the ointment be more easily rubbed in the skin. This pure lanolin has the proper consistence for ointments, and is ready for application without the addition of either of the above substances. This improvement is important, as the addition of glycerine or fat to lanolin is prejudicial to its keeping properties.

MIDWIFERY.

UNDER THE CHARGE OF

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PALPATION OF THE UTERUS PER VAGINAM.

SÄNGER (*Arch. f. Gyn.*, xxviii. p. 54) publishes a series of cases of urinary disorders in which the ureters could be distinctly felt per vaginam. They were about as thick as a goose-quill, and felt in the upper third of the vagina, beginning about 2 cm. (0.75 in.) below the portio vaginalis. The ureters cannot be felt in every woman, but are frequently to be made out during pregnancy. Sänger succeeded in eight out of ten cases of pregnancy, but has never felt them during the lying-in period. The reason why they can be often felt during pregnancy is that they are hypertrophied, and that during the second half they can be pressed against the presenting head.

Observations made on the dead subject coincide with the clinical ones in every respect. Sänger concludes that it is often possible to feel the pars pelvica of the ureters per vaginam, from the points at which they enter the bladder to the base of the broad ligaments, a distance of at most 6–7 cm. (2½ in.)—one-half the length of the pars pelvica, and one-quarter the total length of the ureters.

In pregnant women they can be felt for 10 cm. (4 in.). Sänger thinks it of

much clinical importance in any case of urinary disorder to palpate the ureters in order to discover whether they are healthy or not.

Case of Twins Occupying a Common Amniotic Cavity in which the Cords were Interlaced and Coiled Round Fœtal Parts.

Sedlaczek records a case of the above rare event (*Arch. f. Gyn.*, xxvi. p. 309). A. B., æt. thirty, VI-para, aborted of twins at the fourth month The two placentæ were adherent to one another, and extracted under chloroform. Only one amniotic cavity present. Both fœtuses were found to be macerated, and at various places showed grooves at the points where the umbilical cords had been coiled round parts of the fœtus. The two cords were much above the average length, considering the size of the fœtuses, and inserted close together into the common placenta.

That of the first-born fœtus passed from the placenta to the left knee, there forming a loop round the thigh just above the patella. The fœtal end of the same cord also ran to the knee, and was squeezed against it by the above-named loop. The two portions of the cord—*i. e.*, the placental and fœtal portions—thus brought together, now twisted spirally round one another three times, and after diverging for a short distance, again became approximated to enclose the cord of the second fœtus, this point lying close to the right shoulder of the second fœtus. From there they passed to the front of the neck of the latter, and after separating to embrace it became continuous with one another.

The cord of the second twin ascended from the navel to its right shoulder-joint, where it was held fast by the other cord. Thence it bent outward and passed through the gap left by the other cord to the placenta.

For references to similar cases, and for an exact figure of this one, the original paper must be consulted.

Pregnancy in One Horn of Uterus Bicornis; Retention of the Mature Fœtus; Removal of the Pregnant Horn.

Wiener (*Archiv f. Gyn.*, xxvi. p. 234) records a case of the above in which laparotomy was performed on account of a tumor on the right side of the abdomen, which was seriously affecting the patient's health. The nature of the case was very obscure, some features in the woman's previous history pointing to pregnancy, others to the presence of another form of tumor. On opening the abdomen a uterus bicornis was found, the right horn being pregnant. This was opened, and the fœtus, which was in a state of commencing maceration, extracted. The uterine horn in which the latter had lain was then cut off, the pedicle tied, treated with iodoform, and returned into the abdominal cavity. The patient made a good recovery. The fœtus had all the characters of maturity, and measured 52 cm. (20 in.).

Wiener points out that this rare case must be added to some others recently published, which show that it is not impossible for pregnancy to reach its natural duration in a rudimentary uterine horn, as was formerly assumed to be the case.

On Adenoma of the Placenta.

Klotz (*Arch. f. Gyn.*, xxviii. p. 39) describes a new disease affecting the decidua serotina and of the nature of an adenoma. Mrs. L. aborted of a fœtus about 7 cm. (2.75 in.) long, the placenta not coming away. She got up on the fourteenth day, but repeated hemorrhages came on for the next two months, when Klotz saw her. He dilated the cervix, and found on the posterior wall a soft, crumbling tumor, as large as a large oyster-shell. This he removed with a sharp spoon, in pieces of varying size, and it proved to be of placental origin.

A year later Klotz again saw her, owing to repeated profuse menorrhagia, and again found an irregular crumbling growth, which he treated with the curette. This cured her trouble.

Klotz then goes into a minute description of the histology of the removed masses, which were found to consist largely of adenomatous tissue. His conclusions are as follows:

Adenoma of the placenta originates from the dilated glandular spaces of the decidua serotina; it is started by a fusion of the decidual cells into a homogeneous, nucleated, protoplasmic mass (similar to embryonic connective tissue), and by a conversion of the glandular epithelium into a special epithelium-forming layer, into what Klotz terms "epithelial zuchtzellen." The protoplasmic substance above referred to, grows out in the form of projections, the connective tissue elements taking the largest share in the growth. By further growth and proliferation these various projections become multiplied and interlaced, and form nodules of adenomatous tissue.

After removal of the placental portions that have been converted into adenomatous tissue, the adenomatous growth may recur. The adenomatous degeneration seems to lead to death or expulsion of the fœtus, and to prolonged retention of the placenta.

Klotz has seen this adenomatous growth in three cases, in all of which the symptoms were very similar; recurrence was seen only once.

On Habitual Death of the Fœtus in Utero due to Renal Disease in the Mother.

Fehling (*Arch. f. Gyn.*, xxviii. p. 300) publishes some observations in which renal disease in pregnant women appeared to be connected with habitual death of the fœtus. Five cases are recorded in which albuminuria was detected during pregnancy, sometimes due to chronic parenchymatous nephritis, sometimes to true granular kidneys. In one or two instances constitutional sequelæ caused by the contracted kidneys showed themselves.

Fehling cannot as yet say whether the albuminuria preceded pregnancy or was secondary to it, but the former view is the more probable. In several patients slight albuminuria persisted after delivery, increasing every time pregnancy recurred. The rapid diminution of albuminuria after the death of the fœtus was very marked. No evidence of syphilis could be detected in either parents or fœtus.

The renal disease in these cases led to the death of the fœtus, owing to the placenta having become infiltrated with white infarcts, and to its healthy tissue, therefore, no longer sufficing to nourish the fœtus. The latter was

usually expelled six to eight or even more weeks after death. The placenta was invariably smaller than normal, or even atrophied, the weight being below the average. The infarcts consisted of fibrin nodules, such as are often found in small numbers even in healthy placentæ. In addition to the usual wedge-shaped nodules, Fehling found others irregular in form, tough, and solid on section or filled with vacuoles.

The prognosis for the child is very bad; in only one of Fehling's cases was the life of the child saved, and then only by the induction of premature labor. The prognosis is more favorable to the mother, but where the renal disease is severe she runs great risk from eclampsia and uræmia.

Hydrastis Canadensis does not Induce Uterine Contractions.

Schatz (*Berl. klin. Woch.*, May 10, 1886) again discusses the action of hydrastis canadensis, and defends his original view that while the drug has a vasomotor action on the uterus it does not directly act on the muscular fibres and cause them to contract. Fellner, from recent experiments, believed that such a direct action did occur at any rate in dogs and and rabbits, but Schatz thinks the contractions that Fellner noticed were more probably secondary to the anæmia produced by the drug and not caused by its direct action on the muscular tissue. In this respect it differs from ergot, and may be advantageously used where the latter would be injurious owing to the contractions it might produce.

On the Etiology of Face Presentations.

Schatz (*Arch. f. Gyn.*, xxvii. p. 293) publishes two cases of face presentation produced by an ill-developed shape of the uterus. Some uteri, instead of having two long sides and one short one (at the fundus), are equilateral, or the base may be even longer than the sides, so that the uterus is wider than long. In face presentations the fœtus is flexed on its dorsal aspect, and Schatz thinks that the equilateral form may produce this dorsal flexure. The fœtus will lie most conveniently in such a uterus if the head and breech occupy two corners and if the body is flexed in the direction of the third angle. If the dorsum looks toward the latter, the vertex or breech will probably present; if the abdomen, the fœtus will be extended, and a face presentation may be the result.

Supposing, now, the breech to lie in one of the upper corners and the head at the os, the form-restitution force of the uterus would tend to displace the head of the child toward the side of the pelvic inlet opposed to that on which the breech is placed. If the head is movable above the brim, a transverse presentation will result with the dorsum downward. But if the head has engaged in the brim it can no longer be displaced, and the form-restitution force of the uterus will cause it to be extended and possibly cause the face to present. The author shows no reason for his opinion as to cause and effect. The phenomena seem capable of the converse interpretation.

Injuries of the Vagina and Perineum Accompanying Labor.

Freund (*Gyn. Klinik.*, vol. i. p. 135), after briefly mentioning the injuries to the cervix associated with labor, describes those of the vagina, and points

out that their frequent occurrence at particular parts of the vaginal canal depends on the anatomical structure of the walls at those parts, and on the extent to which they are stretched during labor. The regions most likely to tear are, according to him, in the laquear vaginæ, the lateral portions (where the injuries are usually prolonged from tears in the cervix); in the middle portion of the vagina, the posterior wall, especially the portions on either side of the columna rugarum posterior; and, lastly, at the floor of the pelvis, also the posterior portion. The portion bounding the columna rugarum posterior is especially liable to give way on the side on which the face descends. At the anterior vaginal wall the parts on either side of the columna rugarum anterior are occasionally endangered, especially in presentations with vertex anterior, and at the anterior wall of the vulva the pressure of the descending head often leads to bruising of the structures lying near the symphysis and the pubic arch.

The above injuries may occur where the vagina is of normal structure, but are most frequent where predisposing influences are present. Freund mentions four such: 1. Cicatrices in the laquear left by previous parametric and paravaginal inflammatory processes, by operations for fistula, by excision of large vaginal cysts, etc.; 2, rigidity of the vagina in elderly primiparæ, which especially affects the lower third, and rarely (in persons above forty) the vaginal fundus; 3, congenital narrowness of the vagina, with a generally contracted pelvis or a general infantile formation of body; 4, limited extensibility at certain places, especially where bony masses project into the pelvic canal—*e. g.*, unusually prominent ischial spines.

The severest injuries of the parturient canal are associated with the application of forceps, owing to the circumference of the head being increased by the forceps, to the acceleration of the exit of the head, to the edges of the blades where they are unsymmetrically applied to the head, to the increased relative displacement of the vaginal walls, and to the normal mechanism of delivery being interfered with. The injuries usually affect the same parts as those associated with spontaneous labor, but are more severe.

Freund then discusses the influence which Tarnier's axis-traction forceps has on the production of vaginal injuries. As regards the first four points mentioned above, he finds no great difference between Tarnier's and other forceps, but regards it as especially useful where the head lies in the pelvic brim or is still movable above it.

Prolapse of the Umbilical Cord through the Rectum.

Stroynowski (*Centralbl. f. Gyn.*, May 29, 1886) publishes an instance of the above rare occurrence during labor. Shortly after rupture of the membranes, a loop of the umbilical cord, 24 cm. (9½ inches) long, was observed to be prolapsed through the rectum. The child, well-developed, but partly asphyxiated, was expelled about half an hour afterward, drawing the prolapsed umbilical cord with it. It was successfully resuscitated.

On vaginal examination post-partum, an aperture could be felt immediately above the perineum, and leading into the rectum, through which the prolapse had occurred.

Stroynowski thinks that either the recto-vaginal septum was unusually weak and gave way before the pressure of the head, or that the midwife per-

forated the septum in attempting to force down the head by pressing on it per rectum. The tear healed entirely.

ON THE CONTINUOUS CATGUT SUTURE IN CASES OF RUPTURED PERINEUM.

Various writers have recently recommended continuous catgut sutures in the place of ordinary interrupted silk sutures for bringing the edges of wounds together. KELLER communicates to the *Archiv f. Gyn.*, xxvi. p. 283, the results he has obtained in applying this form of suture to cases of ruptured perineum, results, much better, he says, than those formerly seen when interrupted silk sutures were used.

The plan Keller adopts is the following: After removal of the after-birth, the vagina is irrigated and the sides of the tear are thoroughly cleansed with a solution of corrosive sublimate 0.5 per 1000. He then proceeds to sew up the wound, beginning at the edge of the vagina with an ordinary knotted suture and then carrying a continuous suture in spirals back toward the anus. On reaching the posterior end of the tear the end of the continuous suture may be fastened by knotting it in with an ordinary interrupted suture or it may be tied on to the last spiral turn. In a few cases in which the edges did not come into very accurate contact Keller used one or two superficial interrupted catgut sutures in addition to the deeper continuous ones. The wound when sewn up was covered with iodoform collodium and the patients told to be quiet; their legs were never tied together. Keller was greatly pleased with this form of suture. The line of union was smooth and regular, much more so than with the ordinary *modus operandi*. He ascribes this partly to the edges having been brought into more accurate contact, partly to the greater elasticity of catgut. In forty-one out of forty-two cases, the results were highly successful. One special advantage of the catgut is that it undergoes absorption and therefore does not need removal.

ON THE APPLICATION OF THE FORCEPS TO THE AFTER-COMING HEAD.

FREUDENBERG contributes an article to the *Centralbl. f. Gyn.*, March 27, 1886, in which he combats Lomer's view that it is a difficult operation to apply the forceps to an after-coming head, partly because the fœtal parts block up the vagina, partly owing to the firm impaction of the head caused by previous attempts at extraction. Freudenberg maintains that if the body of the child is properly held it cannot cause any difficulty to the forceps being passed up along the sacral concavity, and when the blades reach the brim there is always plenty of room near the sacro-iliac synchondroses for them to glide up even if the head is impacted in the antero-posterior diameter.

The application of the forceps is usually even easier when the head has descended into the pelvic cavity, though Freudenberg does not deny that in exceptional circumstances it may be difficult.

These cases of an after-coming head have some advantages peculiar to themselves: the delivery of the trunk which has already taken place has thoroughly dilated the soft parts; the neck forms a good guide to the head, and the fixed condition of the latter is a help in applying the forceps. Freudenberg agrees with Lomer that this operation is sometimes the means of saving a child's life, but thinks he has overrated the difficulty attending its execution.

Recent Improvements in the Performance of Cæsarean Section.

Sänger contributes a lengthy article to the *Archiv f. Gyn.*, vol. xxvi. p. 163, on the above subject, in which he contrasts the advantages of the Cæsarean and Porro's operation and discusses the improvements that have lately been introduced into the performance of the former. He also publishes a successful case of Cæsarean section.

The all but unanimous approval with which Porro's operation was received and which it has till lately enjoyed, is due to the high mortality which formerly accompanied Cæsarean section. That excessive mortality is, however, avoidable by means of modern improvements in the *modus operandi*, so that, although Porro's method continues best for some cases, it can no longer be allowed to retain its preëminent position.

The following are some details of the Cæsarean section which Sänger performed according to his improved method:

F. A. S., æt. twenty-one; generally contracted, flat, rickety pelvis; conjugata vera, 6 to 6.5 cm. (ca. 2½ in.) The operation was undertaken as soon as the pains had become strong and the os fully dilated. The abdominal incision measured 16 cm. (6¼ in.), the uterine nearly as much. In making the latter, the placenta was encountered in its whole length and partly cut, and partly torn through, after which the child was extracted. Hemorrhage moderate in quantity. The child was extracted in a state of partial asphyxia, but soon revived.

The uterus was now drawn out of the abdomen and supported on a napkin; the placenta was removed and the lower part of the uterus constricted with an India-rubber tube. No fresh hemorrhage followed the removal of the placenta, and altogether the discharge of blood from the edges of the uterine incision and from the cavity was very moderate. It was most abundant from the lower portion of the incised surface which was found to have involved the lower segment of the uterus.

The next step was the resection and sewing up of the uterus. Sänger first of all detached the serous membrane for a distance of 3 to 4 mm. (0.15 to 0.2 in.) along the whole incision, and then removed a slice of muscle from each incised surface 1 to 2 mm. (0.4 to 0.8 in.) in thickness. Twenty-eight sutures were used to bring the edges of the wounds together, eight being silver, and twenty silk. The silver were passed through the entire depth of the uterine wall on each side and then twisted.

The superficial peritoneal silk sutures were so inserted as to bring the opposed surfaces of the liberated strips of serous membrane into accurate contact. When they had all been inserted, the tube constricting the uterus was removed, but scarcely a drop of blood made its appearance. The uterus was washed with corrosive sublimate, 1 : 1000, and returned into the abdomen, the wound in the latter being closed in the usual way.

The patient did well after the operation; the highest temperature being 37.9° C. (100° F.); highest pulse-rate, 120. The patient was able to leave her bed on the fifteenth day.

Sänger next proceeds to discuss the various steps in the operation.

He recommends corrosive sublimate for disinfecting the abdominal skin and generative organs before the operation. In making the uterine incision

the lower segment should be avoided owing to the circular sinus and large veins lying there. He believes that the numerous deaths from hemorrhage that formerly accompanied Cæsarean section were due to those vessels being divided. The limits to which it is safe to go may be ascertained by the looseness of the peritoneum over the lower segment, and the length of the incision should be regulated accordingly.

As regards the incision involving the placenta, Sänger's case showed that even when the latter lay in the direct line of incision, no great hemorrhage or difficulty need be experienced, nor was the insertion of the sutures rendered more difficult. He thinks it much more serious to wound the coronary vein of the lower segment than to incise the placenta.

Sänger goes fully into the best way of sewing up the incised uterus, and strongly commends the plan of using what are termed "musculo-muscular and sero-serous sutures;" the former being deep, the latter superficial. Three other points are important: rigid antisepsis, leaving the decidua uninjured by the stitches, and the use of such materials for the sutures as are not easily absorbed—*e. g.*, silver and silk.

In inserting the sutures it is most important that two peritoneal *surfaces* be brought into intimate contact; this is far safer than merely bringing the two *edges* together, though success has been attained on the latter plan. In order to approximate the surfaces, it is best to liberate a margin of serosa and to cut away a thin slice of muscle on each side. Sänger thinks a thickness of 2 mm. (0.1 in.) quite enough, and has seen no harm from it. The serosa should be liberated for a distance of 4 mm. (0.2 in.). The sutures should be inserted as close together as possible, one helping to support the other. Moreover, it is best that the sutures should not penetrate the uterine cavity, but run beneath the decidua, otherwise there is risk of the lochia penetrating into the uterine tissues at the points traversed by the sutures and leading to septicæmia. Neither silver nor silk sutures do harm. Silk is entirely absorbed in process of time; silver may either become embedded in the uterine wall and remain innocuous indefinitely, or be discharged into the uterine cavity. A solution of corrosive sublimate is the best for washing the uterus.

These improvements in the performance of Cæsarean section have greatly modified its position *versus* Porro. So long as Cæsarean section "was almost certain death," Porro's operation, with a mortality of fifty-six per cent., was preferable. Now, however, that modernized Cæsarean sections can show a mortality of only forty per cent., while they have the advantage of not depriving a woman of her uterus and ovaries, they should be regarded as far superior operations.

The Etiology of Puerperal Mastitis.

Bumm (*Arch. f. Gyn.*, xxvii. p. 460) discusses the share played by micro-organisms. He has met with two kinds of cocci in mammary abscesses, which differ partly by microscopical characters, partly by their mode of growth in cultivating media. The "staphylococcus pyogenes aureus" forms colonies, which are at first white, afterward golden-yellow. The microscopical characters depend on the treatment—*e. g.*, on staining—adopted; sometimes the shape is circular, sometimes that of a diplococcus. The streptococcus, on the other hand, has some similarity to a chain. Where staphylococci are

present, the abscess begins with deep-seated inflammation, which gradually spreads to the surface; while abscesses due to the streptococcus usually begin with superficial inflammation, followed by an infiltration of the deeper parts and suppuration.

Staphylococci grow readily on almost any nutritive soil, but the streptococcus is not so easy to cultivate. It grows best in agar-agar, forming smaller and more delicate colonies than does the staphylococcus.

Hitherto fifteen cases of suppurative mammary abscess have been published in which cocci were discovered. In eleven the "staphylococcus pyogenes aureus" (or albus) was present; in four the "streptococcus pyogenes."

Bumm believes that these cocci directly provoke the phlegmonous inflammation by their growth and proliferation. The abscesses usually arise by abrasions of the cuticle, though the infection occasionally travels up the milk-ducts.

Bumm also searched for bacteria in milk just taken from women. Great differences were found; sometimes one part of the milk examined contained bacteria, another part none. The distance, also, to which bacteria penetrate into the lactiferous ducts varies greatly, but Bumm feels no doubt that pyogenic staphylococci do pass into the interior of a gland by means of the milk-ducts.

He concludes from his observations that the usual belief as to the danger of allowing milk to stagnate in the mammary glands is well founded.

On the Elimination of Various Substances through the Milk.

Fehling (*Archiv f. Gyn.*, xxvii. p. 332) publishes some observations made to determine what drugs or articles of diet administered to a suckling woman affect her milk.

Salicylate of sodium and iodide of potassium may be detected in large quantities in the milk of woman and pass out both in her own and in the infant's urine.

Ferrocyanide of potassium passes out in the mother's urine but not in the child's. Its amount in the milk is very small.

Fehling also made some observations as to the effect of the application of iodoform to perineal lacerations in the mother. He was able to detect the presence of iodine in her milk and urine, and sometimes but not always in the child's urine. No harm was ever found to result to the child from the application of iodoform to its own body (*e. g.*, to the navel) or to its mother while suckling it.

When mercury was given to the mother, the effect on her infant varied greatly; but generally none could be detected in the latter.

Fehling also investigated the influence on the child of acids given to the mother. He tried citric, hydrochloric, and acetic acids, but none of them affected the reaction of the mother's milk or appeared in any way to disturb the child.

Fehling made similar experiments with narcotics. He gave tr. opii ♏ xxv, to a series of nursing women; in no case did the child become more sleepy or constipated or appear less ready to take the breast. Morphia given subcutaneously in the ordinary quantities was also tried. As a rule, the child was quite unaffected; in one or two instances it seemed to sleep rather long,

but not to a very unusual extent. These experiments show that a mother who has had a subcutaneous injection of morphia may nurse her child without any risk of the drug doing it harm.

Chloral was given to the mother in doses of 1.5 to 3 grammes (gr. 23 to 46); in no case did it produce any alarming symptoms in the child, though occasionally the latter appeared somewhat more restless or sleepy than usual.

As regards atropine, Fehling found that when given to the mother it passed into the infant and dilated its pupils. No harm, however, resulted to the child even when the mother took large doses.

How can most Air be made to Pass in and out of the Chest of Children Born in a State of Asphyxia?

Various writers have recently discussed and sought to establish by experiment the relative value of Schultze's, of Silvester's, and other methods for resuscitating children born in a state of asphyxia.

Lahs (*Archiv f. Gyn.*, xxvi. 273) recommends a somewhat different experimental procedure. He thinks that the use of a manometer for deciding between the rival methods is misleading, for it merely indicates the pressure at which air passes in and out of the chest, while the determination of the quantity of air is of far greater importance. This Lahs attempts to estimate by a modification of Hutchinson's spirometer.

Lahs, moreover, criticises and objects to the methods adopted by Behm and Torggler. These experimenters brought their manometer into direct connection with the trachea, thus avoiding the obstacle opposed by the glottis. A better plan, according to him, is to connect the spirometer with the pharynx through the nostrils, so that the natural obstruction offered by the larynx is not interfered with; moreover, the stomach under these circumstances can admit some air, as it is known to do during efforts at resuscitation.

Lahs considers the question still unsettled as to which is the best way of expanding the lungs of an asphyxiated newborn babe; but future observations should be made on the above lines, and the result will probably be in favor of Schultze's or Silvester's to the exclusion of others.

On the Value of Schultze's Swinging Movements for Resuscitating Apparently Stillborn Children.

Skutsch (*Centralbl. f. Gyn.*, May 22, 1886) tested the value of Schultze's swinging movements under the following circumstances. Vertex presentation; membranes intact. Fœtal movements and heart sounds heard two hours before rupture of the membranes; after the latter event the child was rapidly expelled, stillborn, but with all the signs of maturity. Percussion of lungs showed impaired resonance everywhere. Skutsch at once began to swing the child fifty times, according to Schultze's directions. After the fifteenth swing, inspiratory and expiratory sounds became audible. Chest again percussed: gave a resonant note over every portion of the pulmonary area and a post-mortem showed that the lungs contained a considerable amount of air. Skutsch concludes that Schultze's swinging movements are a satisfactory means of filling collapsed lungs with air.

The dispute on this subject seems somewhat purposeless. The experiments of Champneys in the *Medico-Chirurgical Transactions* (also AMERICAN JOURNAL OF THE MEDICAL SCIENCES for April, 1886) have proved that Schultze's method is one of the most efficacious for ventilating the lungs, the sole difficulty being (as in all other manipulative methods) to insure the patency of the upper air-passages. This can easily be secured by tying in a catheter in the manner there described.

SOME REMARKS ON INFANT FEEDING.

DR. HENRY ASHBY states (*Medical Chronicle*, May, 1886) that it has been shown by recent researches that cows' milk is about four times as rich in casein as human milk, while the amount of salts is some three or four times as much, and the amount of sugar in human milk is half as much again as in cows' milk. The addition to cows' milk of water and sugar, with the object of approximating the various constituents to those of human milk, must necessarily fail as regards one or more of them. Moreover, the addition to cows' milk of lime water, barley water, or a fluid containing dextrin or some other gelatinous substance, does not, as is generally supposed, prevent the bulky coagulation *provided the fluid be left at rest*. On this account Dr. Ashby advocates peptonized milk. This may be readily prepared for infants by pouring four ounces of boiling water on four ounces of milk, adding one-fourth of one of Benger's peptonizing powders, two teaspoonfuls of cream, and allowing it to stand for ten or twenty minutes, according to the amount of peptonizing desired, then adding a teaspoonful of sugar or milk sugar, and letting the infant take it at once. When this form of food is administered, though some curd may appear in the stools it is always soft and passed without difficulty.

Another less expensive artificial human milk may be prepared by mixing one-quarter pint of cream with three-quarters pint of warm water and adding one-half ounce of milk sugar. To this two to ten ounces or more of milk may be added, according to the age or the infant's capacity for the digestion of curd.

Another artificial human milk may be prepared according to Meigs's formula by taking two tablespoonfuls of cream of medium quality, one of milk, two of lime-water, and three of water to which sugar of milk has been added in the proportion of seventeen and three-quarters drachms to the pint, which saccharine solution must be kept in a cool place and prepared fresh every day or two. An infant may take a half pint to three pints of this mixture, according to age. In round numbers, this artificial human milk may be said to contain eleven to twelve per cent. of solids, of which three or four per cent. is fat, one per cent. curd, and six to seven per cent. sugar.

Any one of the above forms of food will generally be found to agree well with a healthy infant, or when it is suffering from dyspepsia or intestinal catarrh.

GYNECOLOGY.

On the Suppuration and Discharge into Mucous Cavities of Dermoid Cysts of the Pelvis.

From a carefully selected series of cases Mr. G. E. Herman (*Obstet. Trans.*, vol. xxvii.) deduces the following conclusions as to the treatment of cases in which a pelvic dermoid cyst has opened into an accessible mucous cavity. Suppuration of a dermoid cyst is sometimes a favorable event, leading to its cure, more especially if the cyst is small and unilocular and if it has opened into the vagina. A dermoid cyst, originally very small, may, when it suppurates rapidly, attain a large size. When the cyst is small it may become inverted through the aperture of discharge, become polypoid, and be spontaneously expelled or easily removed by the surgeon. In some cases this process may be initiated by the surgeon. When a suppurated dermoid cyst has been emptied it contracts, and its cavity either becomes obliterated or remains as a small sinus which causes no trouble. Until the cyst has been emptied cure will not result, hence the first indication for treatment in a cyst which has burst is to empty it. The opening should be enlarged as much as can be safely done, the cavity explored, and its solid contents removed as completely as possible without injury to its walls. In case the cyst has discharged into the bladder its cavity should be reached by vaginal cystotomy in preference to dilatation of the urethra, as being a far safer and much more advantageous proceeding. If the cyst is multilocular, or if, after having been emptied as thoroughly as possible, it does not rapidly contract (from which it may be inferred that it has not been completely emptied), it is likely that it will discharge indefinitely and exhaust the patient's strength, and therefore it should be removed by abdominal section without delay.

On some Forms of Endometritis Corporis.

According to Löhlein (*Berliner klinische Wochenschrift*, June 7, 1886) three forms of the disease exist, one *interstitial*, specially described by Olshausen, in which the connective tissue is largely infiltrated with cells, and overgrowth of the stroma is the essential feature; a second *glandular*, in which enlargement and multiplication of the glands is conspicuous; and, thirdly, a mixed form, specimens of which are often met with. Opponents of "*evidement*," or, as Löhlein prefers to name the procedure "abrasion," maintain that the most frequent form of hyperplastic chronic endometritis is neither macro- nor micro-scopically distinguishable from the condition of the mucous membrane shortly before menstruation; and, therefore, Löhlein lays special stress on the fact that all his preparations have been obtained either from cases of protracted bleeding, or soon after the end of profuse menstruation.

In reference to the treatment of the form of endometritis we are at present dealing with, Löhlein places in the first rank the removal of the overgrown mucous membrane by means of the curette. He guards himself expressly against the assumption that he holds this procedure to be generally indicated in every case of endometritis corporis. The bleeding is by this means

arrested more quickly; more reliably, and (when asepsis is employed) less dangerously than by intrauterine application of astringents or cauterants. In the majority of cases also its action is more permanent, for even if relapses take place, and make repetition of abrasion necessary, this is less to be apprehended from this than from any other treatment. The utility of the spoon compared to earlier methods is the more evident, and its success the more permanent in proportion as we have to deal with circumscribed alterations of the mucous membrane.

Touching on the need of care in the use of the curette, Löhlein remarks, "I never operate on a patient who is walking about, but make her keep her bed for two or three days, and not quit the bedroom for three more. If abrasion is necessary in a case where already acute or chronic inflammation has left behind residual exudations in the true pelvis; nay, in every instance where during or after the operation pain has been experienced I apply during the first twenty-four hours an ice-bag, and cold epithems for some days following. Respecting other precautions, needful to avoid unpleasant consequences, the possibility of an existing pyosalpinx, as well as of perimetritic and ovarian morbid processes, must not be overlooked. In such instances fixation of the uterus by forcibly drawing it down with forceps must be omitted; although usually by this means the special injury of the operation, viz., the repeated dragging on the ligaments during the movements of the spoon, is avoided. Scraping out is then only to be performed when the indication for it is urgent, and is to be made as little dangerous as possible by very steady movement of the spoon with counter-pressure on the uterus from the abdominal parietes."

Septic infection must, of course, be made impossible. No fear need be entertained that the operation will induce the formation of a cicatrix, and so destroy the extremely important agency of the mucosa corporis.

A controversy still exists (1) as to whether dilatation should precede the scraping out, and (2) whether an injection of liquor ferri should be made either immediately, or some days after the operation. In the majority of cases, in almost all women who have borne several children, dilatation is certainly unnecessary. On this head, gynecologists are now satisfied, following herein Schröder's lead. If the procedure is rendered necessary on account of real stenosis of the canal, the choice lies between division (dividing the walls of the cervix), gradual dilatation by cylindrical dilators (Hegar's hardened caoutchouc), and tents. Division by the knife is most advisable in those cases in nulliparæ, where chronic cervical catarrh coexists. Tents are completely avoided by some gynecologists, and the author also uses them very rarely, but he admits that they possess many advantages, especially in cases where a sufficient amount of assistance is not to be had; while the objection which previously attached to them on account of possible infection, can now be completely avoided.

Cauterization of the endometrium with liq. ferri after scraping he has known to produce in some women most torturing pains, in one instance a limited perimetritis; since he has abandoned its use altogether, his results have been quite as good as previously, but though he holds generally that abrasion is the only reliable remedy in cases of hyperplastic endometritis, yet under special circumstances injections of liq. ferri deserve the preference. Such are cases

of fibroid not accessible at the moment to enucleation, and those of hyperplastic endometritis hæmorrhagica. Löhlein does not deny altogether the value of drugs in dealing with this disorder. In cases where the growth of mucous membrane elements and losses of blood are moderate, the use of ergotine, and, according to his recent experience, still more of extract of hydrastis canadensis, is of notable value; he gives both drugs chiefly during the last eight days before the catamenial flow, and also for the most part during the period; and he has received from a good many reliable females affected with chronic hyperplastic endometritis positive statements that the duration of the flow had been reduced, especially by hydrastin, from nine or twelve days to five or six. Some of these had previously undergone abrasion, others had not. He has not yet observed any cases of such obstinately occurring hemorrhage in pure chronic endometritis as to compel him to resort to total extirpation of the uterus.

One point must not be omitted in the treatment of these cases, viz., to regard heedfully any existing complications. If we facilitate the return of venous blood by correcting uterine displacements, by promoting the resorption of existing parametritic and perimetritic exudations, by preventing fecal accumulations, and by a due regard to existing disorders of the respiratory and circulatory apparatus, we do very much to benefit these patients.

As regards the second of the above mentioned forms of endometritis, the exfoliative, the author speaks shortly.

The relative frequency of previous inflammation within or around the uterus is in every way remarkable. This circumstance is certainly not to be neglected in the treatment of the disorder. Like others, he is quite satisfied that the curette is no more capable of thoroughly and permanently removing the evil than the intrauterine injections which were formerly employed. The results of abrasion are, however, more permanent if the existing hyperæmia of the entire organ, the residues of inflammation in its vicinity, and any dyscrasic conditions that may be present are duly regarded and dealt with.

In this, as in so many other morbid states of the internal female genitals, the law holds good that a diseased action is rarely limited to a defined district, and that mucous inflammations are especially prone to creep upward, and, if at all of long duration, to involve the parenchyma and the appendages.

On Castration in Cavernous Myofibromata of the Uterus.

A case of this kind has been recorded by Schleich in his dissertation on this subject where complete recovery was the result of the operation of castration performed by Prof. Saxinger. Dr. Goldenberg publishes a second which occurred in the obstetrico-gynecological clinic of the Academy of Medicine in St. Petersburg.

In the treatment of this case a radical operation seemed clearly indicated. The choice lay between castration and hysterectomy. The recognized great dangers of the latter procedure appeared in this case, where the patient was so debilitated, yet more serious, and likely even to cause death. Castration was, therefore, performed, (1) as the less dangerous operation; (2) as having so many times produced favorable results, in ordinary fibromata, especially (3) on the ground of the case of Prof. Saxinger, in which the influence of

castration in bringing about the menopause, and disappearance of the cavernous tumor, was most strikingly evidenced.

Castration was accordingly performed by Prof. A. J. Lebedeff, on January 20, 1885. For six weeks after the operation there occurred repeated, irregular, comparatively slight losses of blood, then complete menopause. The tumor gradually shrunk, and on dismissal of the patient six weeks after the operation was only of the size of the head of a six months' fœtus. Health was completely regained at home. Only at three periods slight molimina occurred without any trace of discharge of blood.

We have thus two operations performed under like circumstances and with similar success. Though the value of castration may have been disputed by several authors on theoretic grounds, yet all objections to it fade away before the statistics compiled by Wieder, which justify us in regarding castration as the operation to be preferred in uterine fibromata. And if this is the case in ordinary uterine fibromata, it appears to be of still greater value in cavernous myofibromata, since in the latter we have not only to deal with an isolated tumor, but with a diseased state of nearly the whole uterus, and the connection of the whole train of symptoms with menstrual congestion is most clearly apparent. Thus the fact that the climacteric anticipated by the removal of the ovaries can induce the menopause and disappearance of the tumor obtains in the above two cases of cavernous uterine fibromata a still more brilliant realization than in ordinary fibromata; and further justifies us in recognizing this experience as an important proof that menstruation is dependent on the activity of the ovaries; and that castration, especially in cavernous uterine fibromata, is to be estimated as the fittest operative procedure without regard to the size of the tumor, the age, and general condition of the patient.

On the Indications for the Site of the Operation in Cancer of the Cervix Uteri.

M. Hofmeier (*Berliner klinische Wochenschrift*, 1886, vol. xxiii. p. 91,) holds that from a study of the recorded operative results it clearly appears (1) that partial extirpation in many cases of cancer of the cervix, especially in most of those submitted to operation, is sufficient; (2) that it is less dangerous, to a not inconsiderable extent. The eminently practical and important question follows: For what cases is the partial operation sufficient, and what is the total requisite? A decisive answer to this question is given in the anatomical relations of the various forms of cancer, as they are laid down in Ruge and Veit's work based on very ample material. (*Zeitschr. f. Geb. u. Gyn.*, vol. vi. and vii.) Without going into this question more minutely, it will suffice to repeat shortly that three forms, extremely different in their anatomical relation, may be distinguishable, viz., (1) cancroid of the portio vaginalis, (2) cancer of the cervical mucous lining, (3) cancer beginning as nodules in the tissue of the cervix, and making its way to its inner or outer surface. The author's selection of the operation about to be performed has been governed by the above anatomical data; in cancer of the portio vaginalis he performed partial, in cancer of the cervical mucous membrane and cervical tissue total extirpation. The results are given in tabular form.

From the nature of the thing, and partly from the coarse anatomical rela-

tions it comes to pass that cancroids of the portio vaginalis are far more frequently operated on, because they are generally more easily diagnosticated. As they come prominently forward, and are more exposed to traumatic influences symptoms occur proportionately early which call for medical aid. But it is generally sought too late. Cancers of the mucous membrane of the cervix, which mostly appear as ulcerations, and herein are on the whole forerunners of cancer of the body of the uterus, run their course much more latently, and often do not produce symptoms until they have already destroyed the whole substance of the cervix. It is, therefore, certainly true that they are rarely diagnosticated in the early stage; but that they are never diagnosticated, as Jackson maintains, is false. When they are met with in some measure in an early stage they offer apparently a very good prognosis as regards the definitive result. All the cases in which after total extirpation a long enduring cure was noted belonged with one exception to this form of cancer. They resemble in this respect also cancers of the body, which, if operated on tolerably early, afford a very good prognosis. One is certainly not wrong in seeking the cause of this in the anatomical condition of the uterus, which, as a sharply bounded, isolated organ with firm muscular walls, opposes a positive and insuperable barrier to ulcerating cancer.

Very much more unfavorable in this respect is evidently the third form, viz., cancerous nodules in the cervical tissue. Symptoms do not set in here until ulceration has commenced, that is, when the cancer has already existed for a long time. Here total extirpation is usually necessary, because the cancer often extends far into the uterine tissue, and can no longer be entirely removed by a partial operation. The prognosis in these cases appears to be absolutely unfavorable. Most of the relapses after total extirpation occurred under such circumstances.

Thus the indications for the different operations are quite precise, and, according to Hofmeier's experience, we are almost always able, after an accurate vaginal or rectal examination during narcosis, to form a correct idea of the form of cancer in the case before us, and there to choose our operation. If this cannot be done the cancer, as a rule, has produced great destruction, and it is best to give up all idea of a radical operation. The greatest difficulties in diagnosis are occasioned by the ulcerated nodules originating in the tissue of the cervix, because it is often hard to get information respecting the upward extension of the cancer, as well as concerning the degree in which the cervical mucous membrane is involved. In such cases the more radical operation should be preferred; though even then the outlook as regards relapses is very unfavorable. The author appends here a perfected list of his operations from October 1, 1878 to January 1, 1885, which shows on the most cursory inspection how many patients who survived the operation remained healthy after the lapse of one or several years.

During the period mentioned, viz., up to a year before the publication of this work, 105 partial extirpations were performed, of which 10 died. The subsequent destiny of 7 more remains doubtful, among them 1 who died of an acute disease in the first five months. Relapses (fatal) occurred in 43 within the first year. After the first year 45, or fifty-one per cent., remained sound. The table also shows in the most manifest manner that we may regard those who remained sound up to the end of the first year as pretty certainly

cured, at least of uterine cancer, for out of all who remained under observation over a year only 4 had local recurrences. Moreover, in these the local condition was very suspicious before the lapse of a year, so that an earlier date might certainly be assigned to the relapse. We are probably more justified in this than in any other operation undertaken on account of cancer in considering the patient as definitely cured when she has reached the end of the second year consecutive, though, of course, this rule is not without exceptions. Later than two years these local recurrences in this form of cancer do not occur, as is the case also in total extirpations, when most relapses appear before this date.

Thus the selection of this time-point seems very fitting, and if we apply this scale in order to compare the result of partial with those of total extirpations, we get the following outcome: Of 83 cases treated by partial extirpation of the uterus from October 1, 1878, to December 31, 1883—*i. e.*, up to two years ago—68 come before us for consideration. Of these, 31 remained sound, while 37 suffered from relapses, but only 4 in the course of the second year. The author remarks here expressly, that only in 2 of those who had recurrences in the first year after the operation did total extirpation appear indicated on the occurrence of the relapse, which implies that in these instances the disease had propagated itself to the uterus, while in others the pelvic connective tissue was always affected. Reviewing, now, how things went in the total extirpations: during the same term there were 40 operations performed, with 10 deaths. Of the 30 survivors, the result was doubtful in 1 who emigrated to America. Relapses occurred during the year in 15 of the operated, the subsequent fate of the remaining 14 is shown in a table. It appears from this that of 29 cases which have to be considered in estimating the permanent value of the operation, 15 up to a year ago had relapses in the first year, and 14 at the same date were sound. Unfortunately one cannot affirm that of these cases that after the first year the chief danger of relapse was over, for of these 14 no less than 7 had relapses in the second year.

The cause of this difference between the subjects of the two operations lies certainly in the different form which the cancer presented. It should be specially noted that the patient in whom the cure lasted longest had a commencing cancer of the portio vaginalis. In her, on account of suspected extension of the disease to the uterus, total extirpation was performed, while a partial operation would surely have obtained the same success. If thus we take the end of the second year as the measuring date for the eventual efficacy of the operation, the result will be as follows: Of 35 operated on two years ago 9 died; 1 has disappeared. There remain 25 cases, in 19 of which relapses occurred up to the end of the second year, while 6 remained sound. This gives a percentage of 24 for total extirpation. The corresponding figure for partial extirpation is 46. To conclude from this that total extirpation is superior to vaginal is impossible. But it would be just as wrong to affirm that because partial extirpation has given so much better results than total, the former alone is justifiable. The great majority of the cases which have been treated by total extirpation could not have been dealt with by partial. Without doubt, an operation for cancer is justified which renders twenty-four per cent of its subjects sound for several years, while no other radical operation is a possibility.

Since the essential object of this inquiry is to examine what method of operation succeeds best in freeing a patient from her uterine cancer we do not need to consider the recurrences taking place at a late period after operation elsewhere than in the uterus, the so-called regional recurrences. For even total extirpation can only remove the organ itself, but not the lymph glands lying at a distance. Recurrences, therefore, which occur years after operation, the uterus itself remaining healthy, are preventible by no operative procedure. And of this kind have been all the recurrences which were observed later than a year and a half after partial extirpation. In 2 cases (12 and 14 of Table II.) the patients operated upon were under direct clinical observation, of the third a medical report was given, in two other instances (28 and 29) the results of dissection showed that No. 28 died of a great carcinomatous tumor of the pelvis destroying the hip-joint, while the uterus remained quite sound three years after the operation. The second died after an equally long interval, of cancer of the ovary and pelvic connective tissue with similar exemption of the uterus. These two dissections prove that the operation had completely attained its immediate aim, viz., cure of the uterine cancer. View the later recurrences as we will, they did not start from the stump of the uterus, which continued healthy. Therefore, it would have availed the patients nothing if they had, at the outset, been subjected to total extirpation.

The result of the whole inquiry is, that the largest number of patients affected with uterine cancer who come for treatment may, with regard to permanent success, be treated by partial extirpation. Where this is insufficient, total extirpation must be performed, so long as it offers any prospect of success, since by its means cases otherwise desperate may still be rescued. The prognosis of cervical carcinoma compares favorably with that of cancers in other parts, as given by surgical authorities, inasmuch as out of ninety-three cases operated on for this disease up to two years ago, thirty-seven, or 40.2 per cent., remained sound at least two years after the operation.

The best chances for a radical cure appear to be offered by cancroids of the portio vaginalis, if they can be operated on at all early; they exceed in this respect even the lip cancer.

Dr. Brennecke, in reply to Dr. Hofmeier (*Ibid.*), maintains that total vaginal extirpation in cancer of the neck of the womb is, under all circumstances, more useful than partial, without being in the least more dangerous; for (*a*) it averts the eventually threatening dangers of the uterine stump; (*b*) it affords undoubtedly the greatest guarantee against local recurrence; (*c*) as regards safety, compared with partial extirpation it leaves nothing to be wished for.

On Extirpation of the Entire Uterus.

Before entering into the justifiability of this operation, Dr. W. A. Duncan (*Obst. Trans.*, vol. xxvii. p. 8) brings into comparison the results obtained by the abdominal and vaginal methods in the hands of various operators. Out of 137 cases of abdominal extirpation, 99 deaths occurred; whereas, out of 276 cases of vaginal extirpation, there were 79 deaths, thus giving a death-rate of 72 per cent. for the former as compared with 28.6 per cent. for the latter method. Hence, unless there be some special contraindication, the vaginal method should be adopted.

In the performance of this operation, Dr. Duncan makes the following suggestions: First, that when practicable the vessels of the broad ligament should be ligatured as recommended by Schröder, instead of being permanently clamped with forceps as proposed by Sir Spencer Wells. Second, that closure of the peritoneal cavity with sutures is an unnecessary proceeding, from the fact that the bladder, even when empty, falls down on the posterior vaginal wall and contracts adhesions with it, and is sometimes injurious from the risk of wounding the ureters in the attempt. Third, that the insertion of a drainage tube and plugging the upper part of the vagina are injurious, from the fact that they prevent the shutting off of the peritoneal cavity by natural processes. On the other hand, he advocates that the patient be well propped up in bed so as to keep the wound closed by the pressure exerted by the intestines on the bladder and also to facilitate the escape of any exuded fluid into the vagina.

After pointing out the various conditions for which this operation has been performed, he concludes that in cases of malignant disease alone is this operation ever justifiable. And, moreover, it is only in some cases of cancer of the body of the organ that total extirpation is called for. In all cases of cancer affecting the portio vaginalis, and *à fortiori* when there is the least implication of the vaginal walls, total ablation of the uterus, from its immense immediate risks, is an unjustifiable proceeding, when quite as good ultimate results may be obtained from an operation—*i. e.*, supravaginal amputation—the immediate risks to life from which are four times less.

MEDICAL JURISPRUDENCE AND TOXICOLOGY.

UNDER THE CHARGE OF

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Three Cases of Injury of the Heart.

Dr. Schulte, of Hörde, reports three such cases (*Viertelj. f. gerichtl. Med.*, 1886, N. F., Bd. xliv. S. 308–311). They do not present any striking peculiarities, but they are all cases in which there was little or no bleeding externally, and where the blood escaped solely into the pericardial cavity. Accordingly death was not the result of loss of blood, but of pressure of the blood on the heart. The first case was that of a man, ætat fifty-three, who was found dead after an adulterous visit to a married woman. There was no external injury. The pericardium was found to be distended with about 800 c. cm. (28 ounces) of partly coagulated blood. The auricles and ventricles were quite empty. The semilunar valves of the aorta were not quite competent. At the back of the *bulbus aortæ*, within the pericardium, there was a cross rupture of the wall of the bulbus, half an inch in length. The aortic wall was thin and in part of a yellowish color internally. It could not be shown whether the rupture was the result of psychical excitement, or whether

it was owing to a violent tussle with the woman's husband, or whether it was merely the result of accident.

The second case was that of a middle-aged man, who in the course of a quarrel received two revolver-shots in the breast. On the left side of the breast were found two bullet wounds, four inches apart, one of which passed through the cartilage of the fifth rib, close to the sternum, the other having penetrated the fourth intercostal space. The bullet was found close behind the perforated cartilage; the other (both were 7 mm. in diameter) was found with its base sticking in the anterior wall of the greatly distended pericardium, which contained about 600 c. cm. (21 ounces) of blood. There was no serious effusion of blood elsewhere in the chest. The heart was empty, and the anterior wall of the left ventricle, near to the apex, was penetrated by a wound, 5 mm. in diameter, which opened on the inside of the ventricle beneath a papillary muscle, and thus was partly closed by it. The bullet found fixed in the pericardial wall had caused the wound in the heart, but had prevented the blood escaping from the pericardial cavity. The person lived for half an hour after receiving the injury.

In the third case, a man, æt. 20, was stabbed in the breast with a table knife in the course of a quarrel. He walked about fifteen steps, and then fell down dead. The wound, two inches in breadth, was found to penetrate the fifth intercostal space, near to the left side of the sternum. The left pleural cavity contained about two ounces of blood. The pericardium was distended with 600 c. c. (21 ounces) of partly coagulated blood. There was a wound, fully one inch in length in its anterior wall, as it lay against the sternum. The edges of the wound were close together and very little blood had escaped. The heart was empty, and there was a wound, about an inch long, in the anterior wall of the right ventricle.

Murder or Suicide?

Freyer, of Naugard, reports a case (*Vierteljahrsschrift f. gerichtl. Med.*, 1886, N. F., Bd. xlv. S. 45–51) in which he was asked by the authorities to give an opinion. The physician who made the autopsy, stated that he believed the case to be one of suicide. The circumstances were these. A young woman, æt. twenty-five, was engaged to be married to a neighboring peasant's son, who does not appear to have had a high character. The engagement was distasteful to the young man's parents, because the woman was poor; but she would not allow the engagement to be broken. On the 30th of March she proceeded to a neighboring village to have a tooth extracted. On her return homewards, at six in the evening, she had to pass a wood, near which were working the young man and his father. Both these were seen about this time to leave their work and enter the wood. The young woman from this time was missing. Four days later, her dead body was discovered, one and three-quarter miles from the wood, in a deep gravel-pit filled with water. The body stood upright on the steep bank of the gravel-pit, with the top of the head one foot under the surface of the water. The body was fully clad. The head and neck were enveloped in a shawl. The hands rested on the front of the abdomen, and grasped the apron in which her shoes were wrapped. The stockings were not covered with mud or earth. One ear-ring was wanting and appeared to have been torn out. At the autopsy, which was made two days later,

it was found that rigor mortis had not entirely disappeared. *Cutis anserina* was noticeable in some parts of the body. On the neck, the inner side of the thigh, and the middle of the back, there was a brownish-red discoloration, but no subjacent effusion of blood. On the neck, beneath the larynx in front, and the second vertebra behind, a grayish-blue line one-quarter to one-half inch in breadth was observed passing round the neck, and was double in front. The skin was not hardened, nor did the subjacent tissue contain excess of blood. The heart and veins were distended with dark blood. The lungs almost filled the pleural cavities, after removal of sternum. The left of these cavities contained two ounces of a reddish fluid, the right fully three ounces. The lungs were partly adherent to the ribs, and their surface was of a marbled reddish-brown color. They were soft and crepitant. On section, a tolerably large quantity of dark blood, mixed with air-bubbles escaped. A fine brownish-red froth could be freely pressed out of the lungs. The mucous membrane of the bronchi and trachea was covered with a fine frothy reddish mucus. Trachea reddish and empty. Stomach contained twelve ounces of pure whitish fluid mixed with many air-bubbles. Uterus unimpregnated. Based on these appearances, the physician who made the autopsy certified that drowning was the cause of death, and that the case was probably one of suicide. Freyer, however, thinks otherwise. He believes the case to have been one of homicidal strangulation or hanging, the body having been afterward placed in the water. On the authority of Maschka, Hofmann, and Lesser, he denies that the presence of a little fluid in the lungs and stomach is diagnostic of death by drowning, as Lesser has shown that water can penetrate to the extent of several hundred cubic centimetres into these organs after death, if the body is placed in water. He also notes that the lungs were not "balloon-like," and had not the spongy feeling which waterlogged lungs have, and that the fluid which escaped on pressure was not watery. He attaches no importance to the *cutis anserina*. He supports his own opinion of the mode of death by reference to the erect position of the body in the water which he accounts for by the body having been placed in the water after it became rigid; also by reference to the mark on the neck, accompanied by hyperæmia of the brain and lungs, and reddish frothy mucus in the trachea and bronchi, and finally to the ear-ring having been torn out. He believes that the apparent double course of the ligature in front of the neck, along with the general circumstances, point to strangulation having been practised, rather than hanging.

Case of Alleged Infanticide.

Kob, of Stolp (*Viertelj. f. gerichtl. Med.*, 1886, N. F., Bd. xlv. S. 87–95), criticises a case where a young maid-servant was charged with having destroyed her newborn child. The main interest of the case attaches to the peculiar nature of the injury to the child. The cutaneous and muscular tissues of the left cheek extending from an inch behind and below the left ear to the left angle of the mouth were completely torn through and covered with coagulated blood, as was also a portion of the right cheek at the right angle of the mouth. The lower jaw was broken through at its middle, and the whole buccal cavity was quite exposed. The lower part of the tongue was almost completely torn through; there were some nail marks on the neck. The girl stated that these injuries were inflicted during an effort that she

made to separate the child from her body, by grasping the head after the head had been born. She had concealed her pregnancy, and she wished, if possible, while still retaining her situation as servant, also to conceal the birth. The lungs of the child floated in water. The umbilical cord was unbroken, and the placenta was attached to it. Kob saw no reason to doubt the girl's statement. A similar case is recorded in Maschka's *Handbuch der gerichtlichen Medicin.*

Antisepsis in Relation to Legal Responsibility.

In all civilized countries the law holds a physician criminally responsible when, by the neglect to use reasonably proper means to cure his patient, the patient dies; and charges of alleged malpractice are not infrequent in the criminal courts. Laying aside differences of opinion on fine points, which will always exist, the medical profession is fairly well agreed as to the main lines of treatment, or of operative interference, in many forms of injury or disease, and would regard any ignorant and unjustifiable departure from these lines as constituting malpractice. The value of the antiseptic method of surgical treatment is now so universally recognized, although in its modern form it is of quite recent origin, that the administrators of the law are now forced to consider seriously whether the neglect of antiseptic precautions in the treatment of injuries is not to be regarded as criminal, if the injured person die apparently from such neglect. With the object of helping to solve this question, Dr. Carl Deneke, of Flensburg, contributes an article to the *Viertelj. f. gerichtl. Med.*, N. F., xxv. S. 96–115, in which, after considerable discussion of the subject, from many points of view, he arrives at the following conclusions: (1) It is to be regarded as a case of criminal neglect if a surgeon neglects the principles of the antiseptic method in the treatment of injuries or of operative wounds, unless the fulfilling of some vital indication renders adherence to these principles impossible. In illustration of the cases excepted, he mentions the possibility of a surgeon being engaged in brushing a diphtheritic throat, when he is suddenly called to an accident in a neighboring house, where he finds a boy fast bleeding to death from a tear, by a threshing machine, of the thigh, involving the femoral artery, from which the blood is seen to be spirting. His immediate duty is to stop the bleeding by closing the end of the artery with his forceps, although neither his hand nor the forceps has been previously washed. (2) The surgeon who treats a wound or injury according to the approved methods of antiseptic procedure is not to be held responsible in a court of law for any unfavorable course the wound may take. (3) In cases where complaints are lodged against surgeons on account of alleged want of skill in the treatment of wounds, the legal authorities ought, in the course of their preliminary investigation, to submit the case to a medical faculty for its opinion.

The Changes which the Different Mercurial Salts undergo in the Organism.

Fleischer, of Erlangen (*Deutsche med. Wochenschrift*, xi. 36), finds, in agreement with the result obtained by Fürbringer, that calomel, when applied externally to moist surfaces, is converted into a soluble compound, whose stimulating action accounts for the healing effects of calomel when used

locally. He also observed that, if calomel is added to a solution of chloride of sodium, the filtrate is muddy from the presence of reduced metallic mercury, and gives a reaction with stannous chloride. If digested for some time and evaporated and extracted with ether, the filtrate yields crystals of what appears to be corrosive sublimate. The author has therefore no doubt as to sodic chloride acting on calomel to form corrosive sublimate, but he believes, and gives experiments in support of his belief, that the corrosive sublimate is formed, not by the taking of chlorine from the sodic chloride, but by the splitting up of the calomel into corrosive sublimate and metallic mercury. The author confirms, by experiments on cats, Schlæfke's statement that calomel dusted on the conjunctiva becomes yellowish-green, and the conjunctiva inflames if iodide of potassium has previously been administered internally. He also finds that mercuric oxide, after long contact with sodic chloride, forms mercuric chloride, the fluid becoming strongly alkaline from the presence of caustic soda,

$$(HgO+2NaCl+H_2O = HgCl_2+2NaHO).$$

This explains the caustic action of mercuric oxide when applied locally.

Coal-gas Poisoning.

Warfvinge (*Hygiea*, xlvii. 3 *Svenska läkaresällsk. förh.* p. 9, 1885; reported in Schmidt's *Jahrbücher*, Bd. 208, S. 132) gives an account of eight cases of poisoning by coal-gas in houses where there was no gas supply. The persons lived together on a ground floor. They perceived an odor of gas in the house on retiring to bed, but nevertheless went to sleep as usual. They were all found senseless in the morning. They all recovered—five quickly, and the remaining two after a few days of hospital treatment. The ground was frozen at the time, and Warfvinge attributes the presence of gas within the house to its escaping from a broken gas-pipe in the neighborhood of the house, and to its being prevented from rising up through the soil in the usual manner by the frozen ground. Heymann, who criticised the paper after it was read, believes, on the other hand, that the escape of the gas into the house was mainly due to the difference in temperature between the outside atmosphere and that of the house. The gas was in this manner sucked into the house through the ground. He has found by experiment that frozen soil previously moistened is just as pervious to gas as is unfrozen soil.

Toxic Action of the Lower Fatty Acids.

Heinrich Mayer has published in the *Archiv f. exper. Path. u. Pharmak.*, 1886, Bd. xxxi. S. 119–137, the results of an investigation, under the direction of Binz, of Bonn, of the action of the lower fatty acids. This forms a continuation of his work on trichloracetic and trichlorbutyric acids, which has appeared in the same *Archiv*. He finds (1) that, in comparing the action of the sodium salts of trichloracetic and trichlorbutyric acids with those of the non-chlorinated fatty acids, motor paralysis is a prominent and early feature in the action of the former, the sensorium being attacked later; whereas, in the case of the latter, the sensorium is more prominently affected, and motor paralysis is only feebly developed. (2) That the sodium salt of trichloracetic acid has an energetic paralyzing effect on the nerve-centres, whereas the

sodium salt of acetic acid is not more poisonous than chloride of sodium. (3) That, on the other hand, the sodium salt of trichlorbutyric acid has a more feeble action than the sodium salt of butyric acid itself, which exercises a powerful paralyzing effect. (4) That, as regards the salts of the simple fatty acids—formate, propionate, butyrate, and valerianate of sodium—they produce, when subcutaneously injected in cats, drowsiness passing into sleep, coma, and its accompaniments. These symptoms are induced by a dose which, in the case of acetate of sodium, and lactate of sodium, has no action whatever. (5) If formic acid be excluded, which, on account of its aldehydic character, behaves somewhat singularly, all the other fatty acids have their toxic action increased with an increase in the amount of the contained carbon. In point of toxicity, formic acid lies between butyric acid and valerianic acid. These experiments were made on dogs and cats.

The Cause of the Toxic Action of Chlorate of Potassium.

Under this title, Stokvis, of Amsterdam, contributes a lengthy paper to the *Archiv f. exper. Path. u. Pharmak.*, 1886, Bd. xxi. S. 169–218. The contribution is partly experimental, partly critical. The experiments are tolerably numerous, and appear to have been carefully made. The author first investigated the reduction of chlorates within the living organism as tested by estimating the amount of excreted chloride and chlorate in the urine. He then observed the action of organic and organized substances and animal fluids (including blood and urine) on chlorates outside the living body. He next investigated the formation of methæmoglobin in the blood of the living body under the action of chlorates. And, finally, he considers the cause of the toxicity of the chlorates. He obtained practically negative results, and concludes that a salt of chloric acid is not more poisonous than a salt of hydrochloric acid—*e. g.*, he found that chlorate of sodium is quite as innocuous as chloride of sodium when injected into the blood, or when administered by the mouth. He therefore ascribes the toxicity of chlorate of potassium, not to the chloric acid, but to the potash. Potassium chlorate is poisonous, therefore, for the same reason as potassium nitrate, or any other salt of potassium. His conclusion appears to be well founded. It is not, however, altogether novel.

Effects of Drastic Poisons on the Intestinal Tract.

Lucien Butte (*Annal. d'hyg. publ.*, ser. 3, t. xv. pp. 347–364) has made an experimental study on dogs of the effects of colchicine, veratrine, croton oil, and colocynth on the intestinal tract. The substances were administered both by the mouth and subcutaneously, and always in sufficient dose to kill the animal. His conclusions are as follows: All the drastics employed produce inflammation and ulceration of the intestines; but they differ as to the degree of inflammation, and the seat and form of the ulcerations produced. Colchicine and veratrine both cause hyperæmia of the intestinal mucous membrane; but that caused by the colchicine is more intense and more widespread than that produced by veratrine, and there are several submucous ecchymoses, and the enteritis occupies three-fourths of the small intestine. In the case of veratrine, the enteritis hardly extends beyond the duodenum. The ulcerations resulting from colchicine are small and well defined, while those

from veratrine are larger and ill-defined, and are elevated at the centre. In the case of both, the large intestine is only slightly inflamed. Where croton oil had been used, the enteritis was very pronounced, and the submucous ecchymoses were very large and prominent; on the other hand, the ulcerations were very small and superficial. The large intestine was free from inflammation. Colocynth causes a slight congestion of the duodenum, with some small superficial ulcerations. The rest of the small intestine is not reddened. But the large intestine is violently inflamed with elevated longitudinal bands or streaks, of a dark red or blackish color.

The State of the Corpse after Poisoning by Arsenic.

Prof. Zaaijer, of Leyden (*Vierteljahrsschrift fur gericht. Medicin*, 1886, N. F., Bd. xliv. S. 249–277), records the results of the medico-legal investigation of an unusually atrocious series of cases of poisoning by an artisan's wife (Frau Van der Linden) in Leyden who, rivalling even Tofana and Brinvilliers, appears, in the course of a few years—from 1869 to 1883—to have poisoned and attempted to poison with arsenic no less than seventy individuals, of whom twenty-three or twenty-four died, including her father, her mother, and her son. The corpses of sixteen of them were exhumed and examined by Zaaijer, with the assistance of Dr. Koning and Professor Van der Burg. From the scientific standpoint, the author's attention was mainly directed to the progress of putrefaction in the exhumed corpses, especially to their mummification. And, in order to add weight to his conclusions, he collected and compared the published accounts of sixty other cases of arsenical poisoning, in which the dead body was examined either before or after burial. He concludes—and his conclusions are not confined to arsenical bodies—that the bodies of very young children putrefy more quickly than those of adults, and especially of old people. Sex has no influence. Fat, corpulent, lymphatic bodies putrefy more readily than thin and lean bodies. Persons who have died of an acute disease putrefy more quickly than those who have died of a chronic disease. But if healthy men die suddenly they putrefy slowly. There are, however, many individual exceptions to be met with. After certain acute diseases, putrefaction advances very rapidly—*e. g.*, after septicæmia, smallpox, typhus, etc.; on the other hand, cholera corpses putrefy slowly, evidently owing to their containing little fluid, and to the emptying of the stomach and intestines. Poisoning by carbonic oxide, sulphuretted hydrogen, narcotics, prussic acid, and morphine, hastens putrefaction, as do also the various forms of death by suffocation. Poisoning by alcohol, corrosive sublimate, arsenic, potassium cyanide, thymol, chloride of zinc, and chloride of antimony hinders the progress of putrefaction. Dropsical bodies putrefy very quickly. He discusses also the effect of the atmosphere, temperature, moisture, clothing, coffin, and the grave on the decomposition of the body. This author recalls eight cases in his experience, where, by the end of six years, the soft parts of the corpse had almost entirely disappeared. In only one of these cases was arsenic absent. As regards the occurrence of mummification, he formulates the following conclusions: (1) Mummification of dead bodies is of frequent occurrence. (2) Arsenic-free bodies, under the same conditions as arsenic-containing bodies, resist putrefaction equally well with the latter, and mummify as readily. (3) The relatively frequent mummification of the thoracic and

abdominal walls, of the skin round the joints of the hands, knees, and feet, and of the skin of the hands and fingers, is easily explained, apart from the influence of arsenic. (4) There exists no so-called arsenical mummification. (5) Mummification is from the medico-legal and toxicological standpoint of no importance.

Injury to the Head.

Jaumes (*Annal. d'hyg. publ.*, ser. 3, t. xiv. p. 555) reports the case of a man thirty years of age, who, in the course of a quarrel, received a blow on the left side of the head from a stone. The man complained at the time of the injury, but was able to continue his usual occupation for the rest of the day, and to go to the theatre in the evening. On his return from the theatre, however, he died in a few minutes. At the autopsy it was found that there was a depressed fracture of the squamous portion of the temporal bone, with rupture of the posterior branch of the middle meningeal artery, and contusion (with hemorrhagic spots) of the subjacent portion of the brain. The injury had not been of itself sufficient to cause immediate death, but the blood, escaping from the ruptured artery had gradually accumulated and produced a fatal compression of the brain. The interesting point in the case is the light character of the symptoms which immediately followed so grave a cranial injury.

PUBLIC HEALTH.

UNDER THE CHARGE OF

SHIRLEY F. MURPHY, M.R.C.S.

Milk Infection.

For some years evidence has gradually been growing which tends to show that outbreaks of infectious disease amongst milk drinkers have been due to milk which did not receive its infection after leaving the cow; this is especially true where the human disease has been scarlet fever and diphtheria, and, though less frequently, enteric fever. The fact that on a number of occasions it has been found impossible to show by what means this infection has taken place, has raised a considerable presumption that the cow herself must be responsible for this condition of milk; nevertheless such examination of the cattle as has been made has failed to indicate any affection of these animals which may be regarded as a possible source of infection. Recently, however, an outbreak of scarlet fever occurred amongst persons receiving their milk supply from a farm situated in Hendon, Middlesex. This outbreak was the subject of investigation by local medical officers of health, Mr. Wynter Blyth, of Marylebone, London; and Dr. James Cameron, of Hendon, as well as by Mr. W. H. Power, Medical Inspector of the Local Government Board, England. The official report by the latter gentleman has not yet been published, but the evidence contained in the reports of the local officers shows definitely

that milk from this farm was the cause of disease, and it is probable that a vesicular disease, which was found on the udder of the cows on the farm, was the source of its infection.

An interesting account of the cow disease has been presented by Dr. James Cameron, to the Epidemiological Society, and, although the evidence which will prove its relation to the milk infection will not be published until Mr. Power's report is issued, the subject is one of so much importance that Dr. Cameron's account will be read with deep interest. He stated that the disease is not a new one, it has been known to some farmers and cowkeepers at any rate as a catching malady under the designation of sore teats, blistered teats, and the like, but it has never hitherto been recognized or described as a specific contagious disease amongst cows, or considered to have any concern with the causation of scarlet fever in the human subject; it has commonly been regarded as a malady of little importance. The disease first appeared in some newly purchased cows which had arrived on the farm about a fortnight before the first cases of scarlet fever occurred among consumers of the milk. It was subsequently ascertained that one of these cows, which was the first sufferer, introduced the disease into the herd, the malady spreading from shed to shed until the whole herd of 100 cows, with very few exceptions, was attacked, while coincidently with the spread of the disease among the cows in the various sheds, scarlet fever made its appearance and continued to prevail among the consumers of the milk procured from these sheds.

The disease occurs usually in the first instance amongst newly calved cows, and is capable of being communicated to healthy cows by direct inoculation of the teats with virus conveyed by the hands of the cowman. The disease may continue from four to six weeks, and is characterized by general constitutional disturbance, a short initiatory fever, a dry hacking cough, sometimes quickened breathing, sore throat in severe cases, discharges from the nostrils and eyes, an eruption on the skin round the eyes and hind quarters, vesicles on the teats and udder, alteration in the quality of the milk secretion, and well-marked visceral lesions.

With regard to the eruption on the teats and udder, from five to seven days after the commencement of the illness, one or more teats become much swollen, and vesicles or bullæ shortly make their appearance upon them; these vesicles are usually rubbed and broken in milking, leaving sores with raised, ulcerated-looking edges; at this period the disease appears to be easily conveyed to other cows. Shortly after the vesicle has been broken, a brown scab forms upon the sore, and this may remain from ten days or a fortnight to five or six weeks, a thin discharge escaping from beneath it until the sore is healed. There is a tendency for the milk to become ropy during the illness, but this condition is not always present, and, as a rule, is not apparent until the milk has stood for five or six hours, hence the milk from this farm was distributed before this peculiarity had time to show itself.

Dr. Cameron concluded with the following practical recommendations and conclusions:

1. That all newly calved cows, which suffer from any undue constitutional disturbance after calving, should be at once removed from the milk business until completely restored to health.

2. That any cow developing symptoms of this particular cow disease should be at once removed to an isolated shed; should be attended to by some one who has nothing whatever to do with the other cows; should have her skin carefully cleansed, and if necessary washed with a disinfectant, and her teats and udder also washed with carbolic acid or other disinfecting agent.

3. The cowshed, after her recovery, should be thoroughly cleansed and disinfected, and the cow should not be again placed in the milk business until her health is completely restored.

4. That the history of the outbreak points to urgent necessity for the systematic and careful inspection of all farms supplying the public with milk, by men thoroughly conversant with cow diseases, and having special knowledge of such as may possibly be transmitted with milk to human beings. There is room for great improvement in the knowledge of cow diseases among farmers and cowkeepers, and it is to be hoped that government will see fit before long to institute some means of more effectually protecting the general public against recurrence of those disastrous outbreaks of disease which are due to milk.

Lead Poisoning.

Reichardt, of Jena (*Deutsche Vierteljahrsschrift für öffentliche Gesundheitspflege*, Bd. 17, No. 4, S. 565), criticises the conclusions of Hamon and others, that drinking water should not be conveyed in lead pipes. His own experience, dating from 1879, showed that under certain circumstances lead pipes are not prejudicial to water. He examined a number of lead pipes which had been in use for three hundred years, and found that the inside of each was coated with phosphate and chloride of lead, with a small admixture of oxide of lead; that chalk and magnesia were present in very small quantities; and that the pipes appeared to be in good condition. A series of experiments were conducted with distilled water, spring water, and acid water, some of which remained several weeks in the pipes, each pipe containing one litre of water. The distilled water, as well as the acid water, gave, after even a few days, lead reaction, but the spring water remained in the pipe for weeks without showing any traces of lead. In these experiments the pipes were completely filled with water in order to hinder any action of the air, for on all occasions when the opportunity occurred for the lead to become oxidized, it dissolved in the water. Reichardt's conclusions, both in 1879, and after comparison with the analyses made by experimenters in France and Germany, may be summed up as follows: lead pipes are perfectly innocuous for ordinary drinking water when used as closed pipes, or where there is high pressure, but it should be made contrary to law to employ lead for cisterns or open pipes to convey drinking water.

Dr. Sinclair White ("Report on the Action of Sheffield Water on the Lead Communication Pipes, 1886") gives an interesting account of the pollution with lead of the water-supply to a part of Sheffield, England. The town derives its supply from two sources; both supplies are from peaty land, containing also iron pyrites, but the water of one is distinctly acid, and it was thought that this might have arisen from the action of soft water on the pyrites; and secondly, from ulmic and humic acids, which would result from decomposing vegetable substances. The second supply is not acid, and the

area whence it is received contains less peat and much less pyrites. Lead was found in the first only, and that supplied by new lead pipes contained from 0.14 to 0.61 grain per gallon, whereas that supplied by old lead pipes from 0.14 to 0.42 grain per gallon; long pipes caused greater pollution than short ones; the duration of time the water stood in the pipes also had its influence. The effect on water drinkers was very distinct, and led to the investigation, symptoms of lead poisoning appearing only among drinkers of water from the first source. Dr. White recommends the use of limestone for neutralizing the acid of the water.

The Sanitary Record (1886, page 396) states that M. Girard, of the Paris Municipal Laboratory, has sent in a report to the Conseil de Salubrité de la Seine concerning the frequent occurrence of cases of lead poisoning resulting from the use of cisterns which are painted with red lead in order to prevent the metal of the cistern from oxidizing. M. Gautier, Professor of Chemistry, has expressed his concurrence in the opinion that the red lead is responsible for the poisoning, and its use for painting cisterns is to be forbidden.

A bill has recently been introduced into the German Parliament, which has as its object the regulation of the use of lead in the manufacture of utensils used for cooking. No vessel, it is proposed, shall be used which contains more than ten per cent. of lead, solder is not to contain more than the same amount, and no alloy is to be employed for coating iron cooking utensils which contains more than one per cent.

Industrial Diseases.

Bruhat (*Journal d' Hygiène*, vol. ii., No. 500, p. 191) makes mention of the poisoning of a number of people in an aniline factory at Basle from arseniuretted hydrogen. Aniline is usually prepared with benzine converted into nitrobenzine by nitric acid, and by distilling this nitrobenzine in an atmosphere of hydrogen. In France it is usual to employ for the production of hydrogen iron filings and acetic acid; in other countries, and especially in Switzerland, it is customary to replace the acetic acid by hydrochloric acid on the ground of cheapness. A firm at Basle, some weeks ago, used German hydrochloric acid prepared with sulphuric acid produced from copper pyrites, always containing arsenic. In the course of the manufacture of the aniline, the chloride of arsenic contained in the hydrochloric acid which was used was converted into arseniuretted hydrogen, which nearly destroyed the lives of five workpeople.

The *Journal d' Hygiène* (vol. ii., No. 492, p. 96) calls attention to a recent article in the *Asclepiad* by Dr. B. W. Richardson, who mentions that the healthy skin of workpeople, such as chemists, electricians, and autotype artists, bear perfectly the contact of a concentrated solution of bichromate of potash, thanks to the soundness of the epidermis, but that serious accidents follow when there is any breach of the surface, and notes that Dr. Richardson does not indicate a remedy. It observes that workpeople in Paris engaged in making air-balloons and green shades, and who come in contact with the arsenical green of Sweinfurt, suffer from ulceration of the skin on the genitals and other parts of the body, which resemble syphilitic ulcerations, and that Dr. de Piétra Santa successfully uses lotions of salt water and applications of calomel in a state of vapor, producing corrosive sublimate in a nascent state.

F. SCHÜLER (*Deutsche Vierteljahrsschrift f. öff. Gesundheitspfleg.*, Bd. 17, No. 2, S. 274) reports on several cases of lead poisoning amongst Jacquard weavers which appeared toward the end of 1883 and the beginning of 1884 in Stäfa on the Lake of Zurich, Switzerland. The cases occurred in those workshops where many workpeople were crowded together, and where there was but little thought of ventilation and cleanliness. The probable cause of the disease was the dust from the leaden weights which are used by the weavers. These weights are attached to the threads of the warp, and as one thread after another is raised, the weight attached to it is rubbed against those belonging to the others. At first this is unimportant, especially if the lead is smooth and covered with varnish; the latter, however, soon wears off, and if the loom is placed on an uneven floor, or if the leaden weights get out of place, so that they rub against each other more often, then a thin layer of dust by degrees covers the floor under the loom, and this dust contains minute particles of lead. In some instances as much as 56.86 per cent. of the dust was lead, and even where the utmost care is taken nine or ten per cent. of lead is found in the dust on the floor and furniture of the room. Much may be done in keeping the workplaces clean, and building well-ventilated, substantial rooms where there can be no overcrowding; but the only remedy is to abolish the use of leaden weights, and to supply their place with some innocuous material. Glass has been tried as a substitute, but it was found to be useless on account of its brittleness; iron is, however, most often used where lead is condemned, the chief objection being the cost of the iron, but this could be materially lessened if the demand were greater; and this would result if it were made compulsory to replace all lead weights by iron within a certain time, such as two or three years.

The Société de Médecine et de Pharmacie, in the province of Haute Vienne, have recently been discussing questions relating to the health of workpeople and artists employed in the manufacture of Limoges china. M. RAYMONDAUD states that, from his personal experience, the position workers on china are forced to occupy is a cause of spinal curvature, and of thirty-seven such persons observed by him half were in this condition, of whom eight had the right shoulder higher, and six the left shoulder higher than the other. Dr. BOUDET had investigated the conditions under which the work is carried on, and he found that in the early operations of crushing and grinding the quartz, the workpeople are exposed to dust which is dangerous to the lungs. Again, in the preparation of the paste they work on a paved floor over which the water flows continuously, and thus they contract maladies which have direct relation with dampness. Those who are employed to place in the ovens the paste prepared in the factories are exposed to the dangers of an escape of sulphuric acid gas, while those who are occupied in turning, polishing, and dusting the china, suffer from the action of the dust on their bronchial tubes (*Journal d'Hygiène*, vol. ii., No. 492, p. 96).

PRECAUTIONS AGAINST INFECTIOUS DISEASES IN SCHOOLS.

This subject was recently discussed at Freiburg, at the annual meeting of the Verein öf. ff. Gesundheitspflege, when DR. ANNSPERGER read a paper recommending that:

1. All children suffering from infectious diseases or skin affections are to be excluded from school. It is desirable, in order to attain this object, that the teacher should be acquainted with the characteristic appearance of each of these diseases in order to remove all sick children, or suspicious cases, before even communicating with the school committee. The police should inform all teachers of cases of infectious disease amongst children which come under their knowledge.

2. The exclusion from school must continue until either a medical certificate is obtained declaring the recovery to be complete; or in case of not having a certificate, until after a sufficient time has elapsed since the beginning of the illness—*i. e.*, six weeks for scarlet fever, three weeks for measles, a fortnight for diphtheria, and as long as the paroxyms last in whooping cough.

3. Special precautions should be taken by the sanitary police in cases of diphtheria, scarlet fever, and measles. If one of these diseases occurs in a school-house, either the sick person should be immediately removed, or the medical officer of health should be asked whether it be possible to carry out complete isolation of the sick person, and if neither plan is possible, then the school should be closed. Therefore, it is to be desired that the houses in which the children dwell should be so arranged, with regard to the school-house, that no interruption in the teaching need occur. If the outbreak takes place in the house of a teacher, then the teaching must at once cease and the medical officer of health should determine when the teaching may recommence.

4. In order to prevent the spread of these diseases, it is equally necessary for parents and relations of children to give notice to the teacher of any case of infectious disease occurring in the family or house.

In consequence of the extreme contagiousness of measles, all schools or classes should be closed immediately on the appearance of the first cases, especially as it is shown by experience that schools are the chief centres for the spread of this disease. Children, in whose houses the disease has occurred, should be excluded from school until three weeks after the last case has occurred; with regard to scarlet fever six weeks, and diphtheria a fortnight from the beginning of the last case of illness.

5. The isolation of the sick can be thoroughly carried out in only a few cases, therefore it is only occasionally that healthy children coming from an infected house can attend school; and, at any rate, this cannot take place till ten, or with diphtheria five, days have elapsed since the healthy child came in contact with the sick person.

6. If epidemics of children's diseases should occur, the strictest precautions should be taken to prevent the spread of the disease.

7. Ventilation of the school-rooms, increased outdoor exercise of the children, avoidance of much home work, should be specially considered during epidemic times, but special disinfection of schools beyond cleansing and ventilation is not desirable.

8. It should be forbidden to expose bodies of children who have died of infectious disease and to let children take part in the burial.

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